

# THE CRUSTACEA DECAPODA OF SURINAME (DUTCH GUIANA)

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## A. INTRODUCTION

The decapod fauna of the three Guianas (British, Dutch, and French) is very poorly known. A few scattered notes exist which deal with the crabs and shrimps of the region, but no comprehensive account of the Decapoda of any of the three countries has ever been published apart from Young's (1900) "The stalk-eyed Crustacea of British Guiana, West Indies and Bermuda", which, however, also covers the West Indian Islands and Bermuda (including the deep-water species), and furthermore is incomplete.

In the last few decades extensive collections of Suriname Crustacea have been received by the Rijksmuseum van Natuurlijke Historie at Leiden. Especially noteworthy among these is the material from the interior and the coastal area of Suriname gathered between 1938 and 1958 by Dr. D. C. Geijskes, Director of the Surinaams Museum at Paramaribo, and the collections made in 1957 by the trawler "Coquette" during fishery experiments off the Suriname coast. The "Coquette" material in the Leiden Museum forms only part of the total "Coquette" collections, which were divided between the U.S. National Museum at Washington, D.C., and the Leiden Museum.

The present paper not only contains the results of the study of the above collections, but deals with all the Suriname decapod specimens present in the collections of the Zoologisch Museum, Amsterdam; the Zoologisches Museum, Berlin; the Zoologisches Museum, Hamburg; the Rijksmuseum van Natuurlijke Historie, Leiden; the British Museum (Nat. Hist.), London; the Surinaams Museum, Paramaribo; the Museum of the Academy of Natural Sciences, Philadelphia; and the U.S. National Museum, Washington, D.C. In order to give a complete picture of the present state of our knowledge of the Suriname Decapoda, all the published data concerning these animals are also dealt with. Furthermore, practically all published figures of Suriname decapod specimens are reproduced in the present paper.

Chapter B, the first following this introduction, deals with the history of Suriname carcinology. Here, not only is the popular, scientific, and economic literature concerning Suriname Decapoda discussed, but data are also provided on the life and work of various persons who collected Decapoda in Suriname and, by making such collections available to scientists, helped to increase our knowledge of these animals. Finally, a survey is given of the various expeditions during which specimens of Suriname Decapoda have been assembled. In compiling this chapter so many interesting facts came to light that it has become longer than was originally intended; however, since many of the data given here were obtained from sources which, as a rule, are not easily accessible, it was thought useful to include all of them.

A general picture of the occurrence of Decapoda in Suriname is given in Chapter C, while in Chapter D the economic importance of these animals is discussed. The better known predators of Suriname Crustacea are dealt with in Chapter E, and Chapter F provides a list of the vernacular names of Suriname Decapoda as far as such names are known to me.

Chapter G treats the taxonomy of the Decapoda known at present from Suriname. A list of the references dealing with Suriname material is given under each species. This list is followed by an enumeration of the examined Suriname specimens of the species, arranged according to the institutions to which the material belongs; the only exception is formed by the "Coquette" material, which is listed separately for reasons of convenience, the letters W or L after each lot indicating whether the lot is preserved in the Washington or the Leiden Museum. Material from the other Guianas present in the "Coquette" collection or in the Leiden Museum is also listed. Where necessary, a description of the species is given; otherwise a reference to a published description is provided. After the remarks on the species, the type locality, general distribution and occurrence of the species in Suriname

are discussed. The text dealing with species that have not yet been found in Suriname is printed in small type.

Acknowledgements. That this paper could be written is largely due to the help and coöperation of Dr. D. C. Geijskes, Director of the Surinaams Museum at Paramaribo. Dr. Geijskes is not only responsible for obtaining a great part of the material studied, and for much important information concerning Suriname Decapoda, but he also made it possible for me to pay a short visit to Suriname (29 March to 13 April 1957), so that I could become acquainted with the commoner Suriname Decapoda in their natural habitats. Thanks to his active help and guidance I was enabled to visit numerous localities in the coastal region of the country, and to collect Crustacea there. Mr. H. W. Lijding, head of the Fisheries Section of the Department of Agriculture of Suriname, also did everything in his power to make my visit to Suriname a success, and to enable me to obtain an impression of as many habitats as I could possibly visit in the limited time available. I am likewise greatly indebted to the Department of Agriculture of Suriname for financing my Suriname trip, and for the many facilities extended to me during my stay in that country.

I am most grateful to the authorities of the Zoologisch Museum, Amsterdam, the Zoologisches Museum, Berlin, the Zoologisches Museum, Hamburg, the British Museum (Nat. Hist.), London, the Museum of the Academy of Natural Sciences, Philadelphia, and the U.S. National Museum, Washington, D.C., for the privilege of studying the Suriname Decapoda in their collections.

In compiling the chapter on the history of Suriname carcinology I obtained the assistance of many institutions and persons: I wish to express my gratitude to the Rijksarchief (Netherlands State Archives), The Hague, and to the archives of the cities of Amsterdam, Leiden, and Nyköping, Sweden, for valuable information; to many persons who collected Decapoda in Suriname, for autobiographical data; to Dr. Å. Holm, Uppsala, for information concerning Dahlberg and Rolander; to Mr. M. Skytte Christiansen, Copenhagen, for literature and information on Rolander's Suriname diary; to Drs. H. E. Gruner, Berlin, and A. Panning, Hamburg, for data concerning collectors of Suriname Decapoda preserved in German museums; and to the Evangelische Broedergemeente, Zeist, the Netherlands, for information on the missionary C. Heller. Mr. A. M. Husson, Leiden, gave me much help in my search for old literature on the Suriname fauna.

I am likewise most indebted to Dr. C. O. van Regteren Altena of the Leiden Museum for the identification of the gastropod shells inhabited by hermit crabs.

## B. HISTORY OF SURINAME CARCINOLOGY

The publications providing data on Suriname decapod Crustacea can be divided into three categories: (1) popular, (2) scientific, and (3) economic. These categories will be treated separately here.

I. Popular literature. This literature mostly consists of narratives of travels in Suriname and general descriptions of the country; here crustaceans are mentioned more or less incidentally, and hardly ever indicated by a scientific name. Since relatively few species of Decapoda are found in the coastal area of Suriname, and some of them are quite characteristic, it often proves possible to identify the species mentioned in these popular accounts. The number of such popular books on Suriname published in the second half of the 17th, the 18th, and a large part of the 19th century is unexpectedly great; the fact that the country attained its greatest prosperity during that period is probably the most important cause of this abundance of publications. After the decline of the wealth of Suriname around the middle of the 19th century popular books on the country containing such economically useless information as that on quadrupeds, birds, and other animals became very scarce.

For about a century (1659-1761) the only printed information on Suriname Decapoda was to be found in books of the popular category. To my knowledge, the first published account of Suriname Decapoda is given in Otto Keye's (1659, p. 73) book "Het waere Onderscheyt tusschen Koude en Warme Landen" (The true difference between cold and hot countries). On page 73 of this book it is stated that: "De Zee ende oock de Revieren gheven mede veelder-hande slagh van groote en schoone Kreeften ende Krabben: Daer zijn verscheyden soorten van Zee-krabben, Klip-krabben, Moeras-krabben, dewelcke alle seer goedt zijn / ende oock Lant-Krabben, . . ." (The sea and also the rivers bring forth many different kinds of large and beautiful lobsters and crabs: there are various species of sea crabs, rock crabs, marsh crabs, all of which are very tasty, and also land crabs . . . ); the land crabs (*Ucides cordatus*) are then dealt with more extensively. Very little is known about the person of Otto Keye. During the Dutch occupation of Brazil (1624-1654) he was captain of a company of foot soldiers there. It is possible that after the Dutch gave up their Brazilian possessions Keye went to Guiana and obtained the information published in his 1659 booklet. One of the objects of that publication was to arouse people's interest in colonizing Guiana. For in 1659 Keye was back in Holland and had joined a group of colonists under Balthasar Gerbier, Baron d'Ouvily, a Dutchman of French descent who later adopted British nationality. This group intended to found a settlement in Guiana, and evidently needed some advertising in order to get enough people together for the project. In August 1659 they

sailed from Holland and settled on the Approuague River, in what is now French Guiana. Gerbier, the head of the colony, who had taken his wife and three of his daughters with him to Guiana, was a man of great imagination and many ideas, which, however, were not always very practical. He had led quite an adventurous life. Before starting the colony in Guiana he had been a much appreciated artist, first in Holland and later at the court of James I of England; he had been British envoy at Brussels; head of an obscure academy in London; had produced many inventions, most of which proved to be without value; and was well known for his political intrigues. Keye was appointed head of the council of the new colony, and from the beginning did not get on very well with Gerbier, who was evidently not too well suited for his position. The colonists soon became dissatisfied with Gerbier—to such an extent, that he had to seek refuge in the Dutch fort of Nassau, on the island of Cayenne. On 7 May 1660, Keye, with a group of his followers, attacked Gerbier there, killing one of Gerbier's daughters and wounding another (“Dese Moordenaers siende datter twee vande Dochters in haer Bloede gewentelt lagen / meynende dat Gerbier haer Vader oock al Doot was: En hoorende 't Volck van 't Dorp saemen komen / retireerden / latende Catarina Gerbier hare laetste snicken geven / en Maria hare Suster met een doorschoten Been”: *Hollandsche Mercurius*, 1661, vol. 11, p. 83). Gerbier escaped unharmed. Otto Keye and some of his followers were taken prisoner and sent to Holland to be put on trial for murder. This incident meant the end of Gerbier's experiment. Gerbier returned to Holland, and at the end of 1660 left there for England, where he died in 1667 at the age of 75. After Gerbier's departure for England the case against Keye seems to have been dropped. At any rate, nothing more can be found about it, and no further information on Keye seems to be available (cf. De Boer, 1903, and Benjamins, 1926, both of whom also published a portrait of Keye). In 1667 or later (see De Boer, 1903, p. 11, footnote) Keye's book was republished anonymously under the new title “Beschryvinge Van het Heerlijcke ende Gezegende Landt Guajana” (Description of the wonderful and blessed country of Guiana), while in 1672 a German edition was issued. An English version of Keye's book seems to have been published by Gerbier under his own name in 1660.

Keye's account of the Crustacea is reproduced almost verbatim in an anonymous publication (Anonymus, 1676, pp. 39, 40), which proves to be a compilation of all the information on Guiana known at that time. The source of the information is duly given.

Maria Sybilla Merian (born Frankfurt a/Main, Germany, 4 April 1647; died Amsterdam, 13 January 1717), a well-known painter of flowers and

insects, married Johann Andreas Graff at Frankfurt on 16 May 1665. In 1685 she left her husband and, with her two daughters, went from Frankfurt to Wieuwerd in Friesland, the Netherlands, where she joined the Labadist sect. In 1691 she left Friesland and settled in Amsterdam, where, apart from a visit to Suriname, she lived till her death in 1717. In June 1699 Maria Merian departed by boat to Suriname. After having stayed about two years in that country, she returned to Holland for reasons of health, around June 1701. The greater part of her time in Suriname was spent in the Labadist colony of La Providence, on the Suriname River, about 65 km from the coast. Here she made numerous exquisite paintings of Suriname plants and animals (mostly insects), which were first published in 1705. On one of her plates a hermit crab (*Clibanarius vittatus*) is shown; this is also found in the many later editions of her work.

On pp. 200-202 of his 1718 "Beschryvinge van de Volk-Plantinge Zuri-name" (Description of the colony of Suriname), J. D. Herlein, who wrote over the initials J. D. Hl., published an account of several Crustacea, among them large lobsters, named "Homars", which he stated to be "zo groot dat'er maar eenen van noden is om eene Schotel te vullen; haar Vlees is wit en smakelijk, maar wat hard om te verteren. d'*Indianen* vangen haar by nagt op het zand, of op de platen van de zee; en met de hulpe van een Toortsligt of de helderheid van de Mane, zo door-rijgen zy haar met eene kleine yzere vorke". If we compare this account with what De Rochefort (1665, p. 222) in his "Histoire naturelle et morale des Iles Antilles de l'Amérique" said about the Antillean "Homars" (*Panulirus argus* (Latr.)): "Mais elles sont si grosses, qu'il n'en faut qu'une pour remplir un grand plat. Elles ont la chair blanche & savoureuse, mais un peu dure à digeter. Les Insulaires les prennent pendant la nuit sur le sable, ou sur les basses de la Mer, & à l'aide d'un flambeau ou de la clarté de la Lune, ils les enfilent avec une petite fourche de fer", then it becomes clear that Herlein's account is not based at all on Suriname lobsters, but is a mere translation of De Rochefort's text dealing with *Panulirus argus* from the Antillean Islands. Herlein's other descriptions of Crustacea, viz., his "Kreeften", "Krabben die men Tourlourou noemt", "Witte Krabben", and "Beschilderde Krabben", are likewise nothing but translations of De Rochefort's (1665, pp. 223, 253-258) descriptions of his "Canres" (various species of crabs), "Crabes qu'on nomme Tourlourou" (*Gecarcinus* spec.), "Crabes blanches" (*Cardisoma guanhumi* Latr.), and "Crabes peintes" (*Gecarcinus* spec.), all of which are true Antillean forms that do not or only rarely occur in Suriname. Accordingly, Herlein's account, not being based on Suriname Decapoda, should be left altogether out of consideration here. Some later authors made use of

Herlein's book in describing Suriname, thereby perpetuating his arroneous Crustacean records. For instance, Pistorius (1763, p. 85) merely gave an abbreviation of Herlein's text, e.g., "*Kreeften* zyn hier mede in overvloed en in soorten, waar van de grootste zyn, die men *Homars* noemt; van deeze één, kan men een groote Schootel vullen . . ." etc.; the white and the painted crab are also dealt with by Pistorius, whose book, like Herlein's work, consequently does not really contain any information on Suriname Decapoda.

Philip Armand Fermin (born Berlin, Germany, 5 May 1729, died Maastricht, 7 January 1813), a physician who lived in Suriname from 1754 to 1762, published several books on that country after his return to Holland. In two of these publications the natural history of Suriname is dealt with and some attention is given to the decapod Crustacea. In his 1765 "*Histoire naturelle de la Hollande équinoxiale*" Fermin divided the animals into three groups: 1. Quadrupèdes et Reptiles; 2. Des Oiseaux, Poissons, et Testacées; 3. Des Insectes, Vers et Papillons. To each group a special chapter is devoted, in which the animals are arranged alphabetically under their French names. The "Crabe" and the "Ecrévisse" are placed in group 2. Under "Crabe" Fermin listed five species: "Le Crabe au pied large" (= *Callinectes bocourti*), "le Crabe jaune" (= ? *Ucides cordatus*), "le Crabe marbré" (= ? *Goniopsis cruentata*), "le Crabe blanc" (= *Ocypode quadrata*), and "le Crabe appellé soldat" (= ? *Aratus pisonii*). After listing these species Fermin continued with the remark: "Le Crabe de terre qui est abondant dans toute l'*Amérique*, se divise en plusieurs espèces qu'on appelle *Tourlouroux*, & qui sont les plus délicats. Les Crabes violets, les Crabes blancs & les Cériques, sont les trois espèces qui me sont connus". Fermin's information about the terrestrial crabs was evidently taken from Labat (1724, vol. 1 pt. 2, pp. 47-53), who described the species "Tourlouroux" (p. 47) (= *Gecarcinus spec.*), "Crabes violettes" (p. 50) (= *Gecarcinus spec.*), "Crabes blanches" (p. 50) (= *Cardisoma guanhumi* Latr.), and "Cirique" (p. 53) (= *Pseudothelphusa* or *Callinectes*) from Martinique. The Suriname species identified by Fermin with "Crabes violets", "Crabes blancs" and "Cériques" are undoubtedly not the species meant by Labat, but belong to *Ucides cordatus*, *Ocypode quadrata* and *Callinectes bocourti*, respectively. Fermin ends his chapter on the crabs with the remarks that "Toutes ces différentes espèces de Crabes sont très-excellentes à manger", and with indications as how to cook them in order to make them easily digestible. The only species mentioned under "Ecrévisse" is evidently *Macrobrachium carcinus*. Some of the names used by Fermin, viz., *Cancer albicans minor littoralis*, *Astacus major*, and Crabe appellé soldat, are undoubtedly taken from Barrère's (1741) "*Essai sur l'histoire naturelle*

de la France équinoxiale" (pp. 183, 184), on which book Fermin's "Histoire naturelle" is modelled. In his 1769 "Description générale... de la colonie de Surinam" Fermin dealt with the animals systematically, and hence the "écrevisses" and "crabes" are placed together. The text on the Crustacea is quite different from that of his 1765 "Histoire naturelle", and proves to be largely copied from Labat's (1724) "Nouveau Voyage aux Isles de l'Amérique" (vol. 1 pt. 1, p. 105 "Ecrevisses"; vol. 1 pt. 2, pp. 47-53 "Crabes"). The first line of Fermin's text on "Des Ecrevisses" (p. 274) is copied almost literally from Labat, while the second is similar to the text in his 1765 book. The accounts of the four species of crabs: Crabe de terre, *Cancer terrestris, minor* (p. 275), la Violette, *Cancer violaceus* (p. 276), Crabe blanche, *Cancer albicans, minor* (p. 276) and Cirique, *Cancer parvus* (p. 277) are copied practically word for word from Labat's accounts of Tourlouroux, Crabes violettes, Crabes blanches, and Ciriques, respectively. As Labat's crabs originate from Martinique, and belong to species that do not or seldom occur in Suriname, Fermin's account is quite misleading. From his earlier publication we know that Fermin was actually acquainted with various species of Suriname crabs, and hence the names given by him in 1769 are intended for true Suriname species, to which, however, his descriptions do not apply. This leads to peculiar inconsistencies, such as the following. By the name *Cancer albicans, minor* Fermin obviously meant to indicate *Ocypode quadrata*, which is indeed a rather small form compared with, for example, *Ucides cordatus*. The description, however, is that of the large *Cardisoma guanhumi*; the sentence in this description "Elle est d'une espece plus grosse que la précédente" is true of *Cardisoma*, but not of *Ocypode*. The preceding species, namely, is *Cancer violaceus*, by which name Fermin meant to indicate *Ucides cordatus*, while the description is that of a *Gecarcinus*, which never attains the size of *Cardisoma guanhumi*. Fermin's *Cancer terrestris, minor* is probably one of the smaller grapsoid crabs, though the description is that of a species of *Gecarcinus*. His "Cirique" is evidently the Suriname "Sirika", *Callinectes bocourti*; the description is that of a *Pseudothelphusa* or *Callinectes* from Martinique.

In 1769 Edward Bancroft (born 1744, died 1821), an English physician, chemist and naturalist, who made several visits to both North and South America and lived in Demerara for some time, published his "An Essay on the Natural History of Guiana", which deals with Suriname and Demerara, at that time both Dutch possessions (cf. p. iii of Bancroft's introduction: "It is necessary to inform the Reader, that the Author's Observations on this Subject have been confined within the limits of the Dutch territories in Guiana"). In this book Bancroft dealt rather extensively with the "Land-

Crab" (*Ucides cordatus*) of that region, but he paid no attention to the other Crustacea. A German (1769) and a Dutch (1782) edition of Bancroft's book were subsequently published.

Jan Jacob Hartsinck (born Amsterdam, 14 October 1716, died Amsterdam 28 October 1779), who occupied an important post in the Dutch West India Company, published a now classic description of Guiana in 1770. A German translation of this appeared in 1780. As Hartsinck never visited the Guianas himself, most of his information on the natural history of the region was necessarily obtained from previous authors. The greater part of his data on Crustacea were taken from Fermin (1765).

John Gabriel Stedman (born in the Netherlands in 1744, died Tiverton, England, 7 March 1797), an officer of the Scottish Brigade in the Netherlands, accompanied the troops that were sent to Suriname in 1773 to help suppress a revolt among the negroes there. Stedman stayed in Suriname till 1777, when he returned to the Netherlands, which he left for England in 1783. In 1796 the first of two English editions of his "Narrative of a five years' expedition, against the Revolted Negroes of Surinam" was published. This first English edition was soon followed by translations into French (1798) and Dutch (1799-1800), and abridged editions in German (1797, 1797a), Dutch (1799a), and Swedish (1800a). The second volume of the second English edition was published in 1806, the first volume in 1813. In this work the natural history of Suriname is quite well treated; of the Crustacea, the swimming crab, *Callinectes bocourti*, and the river prawn, *Macrobrachium carcinus*, are mentioned.

J. D. Kunitz, a German, spent almost 20 years in Suriname (evidently arriving there in the Dutch colonial forces and ending up as manager of a plantation). In 1805 he published a book, "Surinam und seine Bewohner", in which some attention is paid to the animal kingdom. The only crustacean dealt with is the land crab, *Ucides cordatus*.

In 1810, Baron Albert von Sack, a German nobleman, who spent several years (1805-1807, 1810-1812) in Suriname for the benefit of his health, published an account of his experiences during his first stay in that country. The original edition of his book is in English, because the political situation in Europe made it impossible for Von Sack to return to his home country, and he sought refuge in England, which he left in 1810 for a second visit to Suriname. Von Sack mentioned three species of "Land Crabs" (p. 274); one of these species, which is said to be "small and of a gray colour", may have been any of the smaller grapsoids, the others can be identified as *Ucides cordatus* and *Ocypode quadrata*. Von Sack's account was later (1821) published in German and Dutch editions; in both of them his second stay in Suriname

is also dealt with. No additional information on Crustacea is contained in either of these editions.

Marten Douwes Teenstra (born Oldehove, Groningen, 17 September 1795, died Ulrum, Groningen, 29 October 1864) was the son of a Groningen farmer. After having spent some time in the East Indies, Teenstra was appointed Government Agriculturist in Suriname, where he stayed from 1828 to 1834, during which period he paid some visits to the Netherlands Antilles. In 1835, after his return to the Netherlands, Teenstra published his "De Landbouw in de Kolonie Suriname" (The agriculture in the Colony of Suriname), a book which contains a wealth of information on the natural history of the country. Teenstra, like most of his predecessors, indicated the various Decapoda discussed by him by non-scientific names. He is the first to mention the occurrence in Suriname of the marine prawn *Xiphopenaeus kroyeri*. He dealt also with *Macrobrachium carcinus*, *Ucides cordatus*, *Callinectes bocourti*, *Goniopsis cruentata*, and *Clibanarius vittatus*, and reported upon a majid, which is possibly *Libinia ferreirae*.

Pierre Jacques Benoit (born Antwerp, 1782, died Brussels, 1854), a Belgian artist, spent some time in Suriname, and afterwards published his "Voyage à Surinam", containing 49 plates depicting the country and the people of Dutch Guiana. In the text Benoit made a casual mention of the river prawn, *Macrobrachium carcinus*, and of crabs in general.

August Kappler (born Mannheim, Germany, 10 November 1815, died Stuttgart, Germany, 20 October 1887), was the last and also the best of the popular authors dealing with the country and natural history of Suriname as a whole. His accurate and original observations make his books still the most important sources of information on the Suriname species of many animal groups. Kappler first went to Suriname in January 1836, as a soldier in the Dutch Suriname detachment; he stayed there till 28 November 1841. After having spent a short time in Germany he returned to Suriname in 1842, and, apart from two short visits to Europe (June 1845-March 1846, and September 1852-June 1853), stayed in that country till 1879, when he returned to Germany, a rich man. During his second stay Kappler made his money mainly by trading in timber, farming, and selling natural history specimens. He spent most of his time in Albina, a village on the Marowijne River, which he founded in 1846 and named after his wife. In 1881 Kappler published his "Holländisch-Guiana", in which several crabs (*Ucides cordatus*, *Callinectes bocourti*) and prawns (*Xiphopenaeus kroyeri*, *Macrobrachium carcinus*) are dealt with. In his later (1887) work "Surinam" the Crustacea are more extensively treated and, in addition to the just named species he mentioned "Pagurus" (= *Clibanarius vittatus*), "Sandkrabbe" (= *Ocypode*

*quadrata*), and "eine Seespinne, *Maja*" (= probably *Libinia ferreirae*). He spoke of "kleinen Krabbenarten, die kaum fingerbreit in den brennendsten Farben von rot, braun, gelb und blau unter den Mangrovenbäumen sich aufhalten. Sie sind zu klein, um gegessen zu werden, und nur Krebs Hunde (Procyonen), eine Eule, ein kleiner Falke und Wasservogel stellen ihnen nach". These, of course, are several species of small grapsoid crabs such as *Sesarma*, *Goniopsis*, *Aratus*, etc. Kappler was the first person to point out that the crustacean fauna of Suriname, though rich in individuals, is poor in species, as "die surinamische Küste vom französischen bis ins britische Guiana ganz flach ist und meistens aus einem blauen Lehm besteht, der bei jeder hohen Meeresflut überströmt wird, nirgends Felsen daran vorkommen und nur einige Sandbänke das schlammige Ufer unterbrechen, das Seewasser trübe und wegen der Einmündung bedeutender Flüsse weniger salzhaltend ist, so kommt auch hier nicht die so interessante Meeresfauna von Korallen, Muscheln, Seesternen, Langusten und Seekrebsen vor, die man an anderen Küsten des tropischen Amerika's findet".

The present category might also include the narratives of the various expeditions to the interior of Suriname, in which Crustacea are sometimes mentioned. The identity of the crustaceans cannot be made out from the information given in these publications alone, but only by study of the actual specimens, most of which are now preserved in the Leiden Museum (see also pp. 34-41).

II. Scientific literature. This relates in the first place to actual specimens and their taxonomy; the authors of the papers in this category usually deal with preserved specimens which have been collected by other persons. Information on Suriname Decapoda in scientific publications is extremely meagre and consists mainly of the occasional mention of such animals in papers treating Crustacea from other regions.

The first scientific publication containing information on Suriname Crustacea is the third volume (1761) of "Locupletissimi Rerum Naturalium Thesauri" by Albert Seba (born Etzel, Ost Friesland, Germany, 2 May 1665, died Amsterdam, 2 May 1736), an Amsterdam apothecary of German descent, who owned an extremely rich collection of natural history objects. The Crustacea figured in Seba's Thesaurus include two that are said to originate from Suriname. These are "Squilla, Crangon, Americana, major" (= *Macrobrachium carcinus*) and "Squilla, Crangon, Americana, altera" (= *Panulirus guttatus*). The figures of these species are so excellent that their identity is not open to the least doubt.

The first Suriname decapod to receive a binominal name is *Ucides corda-*

*tus*, which was published under the name *Cancer cordatus* by Linnaeus (1763) in the thesis "Centuria Insectorum" of his pupil Boas Johansson. The type material of *Cancer cordatus* was collected in Suriname by C. G. Dahlberg (see p. 17). The Suriname record of *Cancer cordatus* was repeated by many subsequent authors (Linnaeus, 1767; Houttuyn, 1769, who gave an original figure of the species; Fabricius, 1775, 1793; Stadius Müller, 1775; Herbst, 1783; Olivier, 1791; Latreille, 1802-1803b).

In 1778, Baron Carl de Geer (born 1720, died Stockholm 1778), a Swedish nobleman and noted entomologist, published in the seventh volume of his "Mémoires pour servir à l'histoire des Insectes" a very extensive and well-illustrated description of *Goniopsis cruentata*, based on Suriname material collected by Daniel Rolander (see p. 19); unfortunately De Geer indicated the species by the incorrect name *Cancer ruricola* L. It is probable that De Geer's *Cancer pelagicus* is *Callinectes bocourti*, and that his *Cancer vocans* is *Uca rapax*, while his material of both may also have been collected in Suriname by Rolander. There is some confusion concerning the correct spelling and origin of the family name De Geer, which by some authors is written Degeer. The origin of the De Geer family is not to be found in France, Germany or Holland, as is often maintained, but in the French-speaking part of Belgium. Louis de Geer et de Gaillarmont (1535-1602) came from Liège, Belgium; the family name De Geer being derived from the name of a small river (Geer in French, Jeker in Dutch), which flows through N.E. Belgium, joining the Meuse River on Dutch territory at the town of Maastricht. The name "De Geer" is also that of a castle close to Liège. Louis de Geer (1587-1652), a son of the above, left Belgium, since he was of the Protestant religion, and finally settled in Amsterdam, where he became a very prominent figure in the business world. He dealt mainly in implements of war and, by selling these to Sweden, acquired many interests in that country, including concessions in the Swedish mining area, where he finally became the owner of a flourishing steel concern. He was a very influential person both in Holland and Sweden, and was made a member of the Swedish nobility. He had 14 children, some of whom settled in Sweden and some remained in Holland; at present the De Geers belong to the most prominent families in both countries.

In 1822 Gabriel Daniel Collin (born Stockholm, 24 April 1800, date of death unknown), a pupil of the well-known biologist Professor C. P. Thunberg, who was Linnaeus's successor at Uppsala University, published a thesis entitled "Fauna Surinamensis". Collin, who became a schoolteacher on completion of his studies, never visited Suriname, and his pamphlet contains a mere list of names of the animals reported from Suriname by Gmelin and

Fabricius (cf. Holthuis, 1958a, pp. 71-85). The list is not critical, and is incomplete and inaccurate, but is nevertheless interesting as a first attempt to compile a check list of the animals of Suriname. The only decapod mentioned is *Cancer cordatus* L., though at that time no less than 7 species (*Macrobrachium carcinus*, *Panulirus guttatus*, *Clibanarius vittatus*, *Callinectes bocourti*, *Goniopsis cruentata*, *Ucides cordatus*, and *Ocypode quadrata*) had been reported from Suriname. However, most of these had only been mentioned in popular literature, and at that time had not yet obtained a scientific name.

Dr. Wilhem de Haan (born Amsterdam, 7 February 1801, died Haarlem 15 April 1855), who was in charge of the Division of Invertebrates of the Leiden Museum from 1823 to 1846, contributed the Crustacea volume (1833-1850) to P. F. von Siebold's *Fauna Japonica*. In this work he made mention of a species of *Sesarma* (*S. rectum*) from Suriname, to which, however, he did not give a name. In the same volume De Haan dealt with two species (named *Palaemon Lamarrei* H. Milne Edw. and *Palaemon brevicarpus* nov. by him) which he thought to originate from Japan, but which actually came from America (presumably from Suriname) and, as shown by later authors (De Man, 1879; Sunier, 1925; Holthuis, 1952), proved to belong to *Macrobrachium amazonicum* and *M. carcinus* respectively. De Haan's Suriname material was collected by H. H. Dieperink (see p. 21); to honour this collector De Haan even named a species after him, *Palaemon Dieperinkii*, but neither the description nor the name were published by De Haan. It was De Man (1879) who unearthed this name when he studied De Haan's type material; in the meantime, however, the species had already received a name from another author (cf. *Macrobrachium amazonicum*, p. 85).

An important contribution to Suriname carcinology was made by Dr. J. W. Randall, a Boston physician, who in 1840 published the description of no less than four new species, the material of which was collected in Suriname by Dr. C. Hering (see p. 23). The specific names of two of these species are still valid (*Potamocarcinus latifrons*, and *Sesarma rectum*), the other two names being synonyms of *Goniopsis cruentata* and *Clibanarius vittatus*, respectively. Some of this material has been dealt with by later authors (Kingsley, 1880; Ortmann, 1897; Rathbun, 1905).

Carl Gottfried Semper (born Altona, Germany, 1832, died Würzburg, Germany, 1893) obtained his doctor's degree in zoology at Würzburg University and later, after having travelled in Europe and the Philippines, became lecturer (1866) and professor (1869) at the same university. In 1869, in a paper on the genus *Macrobrachium*, he mentioned the presence of Suriname material of *M. carcinus* in the collection of the British Museum; the collector of this material is unknown.

In his doctor's thesis Richard Neumann (1878) gave a catalogue of the Crustacea Podophthalmia of the Heidelberg Museum. Among them he listed Suriname material of six species: "*Actaea setigera* Milne Edw.", "*Calappa marmorata* Fabr.", "*Scyllarus aequinoctialis* Fabr.", "*Ibacus antarcticus* Fabr.", "*Callianidea typa* Milne Edw.", and "*Gonodactylus chiragra* Fabr." As none of these species has ever been reported from Suriname either before or since, and as the ecology of several of them, if not of all, makes it highly unlikely that they were collected on the muddy Suriname coast, it seems very probably that they have been incorrectly labelled as to locality, and that they actually originated from the West Indian Islands.

Johannes Govertus de Man (born Middelburg, 2 May 1850, died Middelburg, 19 January 1930) studied biology at Leiden University and obtained his doctor's degree there in 1873. He was one of the foremost Crustacea specialists of his time, and from 1872 to 1883 was in charge of the invertebrate collections of the Leiden Museum; afterwards he lived in retirement in the Dutch province of Zeeland, giving all his time to taxonomic research on decapod Crustacea and Nematoda. He was most interested in the Indo-West Pacific Decapoda, but in a few cases dealt with Suriname material. As already pointed out above, De Man (1879) published the manuscript name *Palaemon Dieperinkii* De Haan, while at the same time he drew attention to the fact that De Haan's so-called Japanese specimens of *Palaemon Lamarrei* are indistinguishable from South American specimens of the species which is now called *Macrobrachium amazonicum*. In 1892 De Man described and figured specimens of a *Sesarma* collected in Suriname by Dr. H. F. C. ten Kate, which he identified as *Sesarma recta* but which later proved to represent a distinct species, for which a new name was proposed by two authors almost simultaneously (*S. benedicti* Rathbun, 1897, and *S. chiragra* Ortmann, 1897). Later (in 1912 and 1925) De Man briefly mentioned Suriname material of *Macrobrachium acanthurus* and *M. carcinus*, the collector of which is unknown and which is still preserved in the collection of the Leiden Museum.

John Sterling Kingsley (born Cincinnatus, N.Y., U.S.A., 7 April 1854, died Berkeley, Calif., U.S.A., 29 August 1929) obtained his Sc. D. degree at Princeton University in 1885. Between 1887 and 1921 he was Professor of Zoology at the University of Indiana (1887-1889), the University of Nebraska (1889-1892), Tufts College (1892-1913), and the University of Illinois (1913 till his retirement in 1921); from 1876 till 1878 he occupied the post of Curator of the Peabody Academy of Science. In 1880, in his Synopsis of the Grapsidae, Kingsley dealt with Suriname Crustacea collected by C. Hering. Some of these had already been reported upon by Randall, but the

first mention of one of them (*Planes minutus*) was made on this occasion by Kingsley.

In 1892 Johann Thallwitz, who was Assistant Curator of the Royal Zoological Museum of Dresden, Germany, and later became a teacher at a secondary school in that town, published a catalogue of the Decapoda and Stomatopoda of the Dresden Museum. In this catalogue material of *Pericera cornuta* (= *Stenocionops furcata*) is mentioned as being from Suriname; the collector is unknown.

Arnold Edward Ortmann (born Magdeburg, Germany, 8 April 1863, died Pittsburg, Pa., U.S.A., 3 January 1927) studied at the universities of Kiel, Strasbourg, and Jena, and obtained his doctor's degree in 1885. On his return from an expedition to Zanzibar, Ortmann became instructor at Strasbourg University; in 1894 he settled in the U.S.A. At first Curator at Princeton University (1894-1903), he later became Curator at the Carnegie Museum in Pittsburgh (1903-1927) and professor at Pittsburgh University (1910-1927). In a catalogue of the Decapoda of the Strasbourg Museum, Ortmann (1894) mentioned Suriname material of *Ucides cordatus* (collector unknown), while later (1897) he published the results of a re-examination of some of Randall's Suriname types, and suggested the new name *Sesarma chiragra* for a species based on Suriname material which De Man (1892) had incorrectly identified with *Sesarma rectum*.

Mary Jane Rathbun (born Buffalo, N.Y., U.S.A., 11 June 1860, died Washington, D.C., U.S.A., 4 April 1943) became a clerk with the U.S. Fish Commission in 1884 and transferred in 1886 to the U.S. National Museum, Washington, D.C., where she was appointed copyist in the Division of Marine Invertebrates. Later she became aid, and finally Assistant Curator of that division. In 1914 she resigned this post so as to permit the appointment of an assistant, which appointment would otherwise have been impossible for financial reasons. However, Miss Rathbun continued her research work at the Museum, now with the title of Honorary Associate, until 1939, when her health finally prevented her from leaving her home. In 1917 she obtained her doctor's degree. Miss Rathbun is best known for her fundamental monographs on American crabs, while she also published numerous other papers on decapod Crustacea. In one of these papers (Rathbun, 1897) she proposed a new name, *Sesarma benedicti*, for a species, based on Suriname specimens, which De Man had previously incorrectly identified with *Sesarma rectum*. In 1905 Miss Rathbun described a new species of fresh-water crab, *Pseudothelphusa wymani*, the type material of which was collected in Suriname by Professor Jeffries Wyman.

Sir D'Arcy Wentworth Thompson (born Edinburgh, 2 May 1860, died

St. Andrews, Scotland, 21 June 1948) studied at Edinburgh and Cambridge, and in 1884 became Professor of Biology at Dundee, a post which he occupied till his death in 1948. In a catalogue of the Crustacea of the Dundee Museum, Thompson (1901) made mention of three species of Decapoda from Suriname (*Macrobrachium amazonicum*, *Ucides cordatus* and "*Gelasimus vocator*"; the latter being a species of the genus *Uca* whose correct identity cannot be ascertained). The collector of this material is not known; it might have been W. Gillespie (see p. 27).

Johan Jacob Tesch (born Amsterdam, 7 February 1877, died The Hague, 7 August 1955) studied biology at the universities of Leiden and Utrecht and obtained his doctor's degree in 1906. From 1907 to 1908 he was Assistant Curator, and from 1915 to 1918 Curator of the Division of Crustacea of the Leiden Museum. Except for these two periods he was connected continuously with the Netherlands Institute for Marine Research from 1906 to 1942, starting as a second assistant and ending as head of the institute. After his retirement in 1942 Tesch became an honorary associate of the Leiden Museum. In 1914 he published the chapters "Callinectes", "Crustacea", and "Gecarcinidae" of the Encyclopaedie van Nederlandsch West-Indië, which were partly based on material present in the Leiden Museum. Some information on Suriname *Callinectes bocourti*, *Ucides cordatus*, *Sesarma rectum*, *S. benedicti*, *Pseudothelphusa denticulata*, *Potamocarcinus latifrons*, *Ocypode quadrata*, and *Macrobrachium carcinus* can be found there. Tesch's supposition that *Atya scabra* (Leach) might be found in Suriname has not yet been substantiated. In his 1917 paper he dealt with the Suriname material of *Sesarma benedicti* and *S. rectum* present in the Leiden Museum and collected by Dr. H. F. C. ten Kate, Dr. M. D. Horst, and Jhr. W. C. van Heurn.

Armand Louis Jean Sunier (born Rotterdam, 17 December 1886) studied biology at the universities of Leiden and Groningen, obtaining his doctor's degree at the latter university in 1911. From 1911 to 1923 Sunier worked as a fisheries biologist in Batavia, Netherlands East Indies. In 1923 he was appointed Curator of Crustacea at the Rijksmuseum van Natuurlijke Historie at Leiden. In 1927 he relinquished this post for that of Director of the Amsterdam Zoo, which he occupied till his retirement in 1953. As Curator of Crustacea at Leiden Sunier published in 1925 a short note on Palaemonidae in which he mentioned Suriname material of *Macrobrachium amazonicum* from the Leiden collection.

Adriaan Reyne (born Uitgeest, 1890) studied biology at Utrecht University and obtained his doctor's degree there in 1926. From August 1918 till July 1925 Reyne was entomologist at the Agricultural Experiment Station of Suriname. After teaching in a secondary school in Holland from 1925 till

1927, he accepted a position as biologist in the Netherlands East Indies, where he stayed till 1933, when he returned permanently to the Netherlands. In 1922, in his function of entomologist at the Suriname Agricultural Experiment Station, he sent some Crustacea from trenches near Paramaribo to the U.S. National Museum, Washington, D.C., for identification. The results of the identification were published by Reyne in 1923; one of the species proved to be *Macrobrachium jelskii*.

The present author dealt with Suriname Decapoda in a number of taxonomic papers (Holthuis, 1948, 1950, a, b, 1951, 1952, 1958).

In 1957 Dr. Teresita Paulucci née Maccagno, Curator of the Istituto e Museo di Zoologia dell'Università, Turin, Italy, and her pupil B. Cucchiari, published a revision of the Palaemoninae of the Turin Museum, in which paper mention is made of Suriname material of *Palaemonetes carteri* and *Macrobrachium jelskii*, obtained as a gift from the Leiden Museum.

III. Economic literature. This deals exclusively with the Suriname prawn fishery and dates from the last 25 years.

Johnson & Lindner (1934, p. 80) noted that in Suriname "fresh shrimp are taken from the river and dried shrimp are imported in large quantities from the United States". E. J. Reyntjes (1953, 1954), who from April 1949 to August 1953 was the head of the Fishery Section of the Suriname Department of Agriculture, and his successor, H.W. Lijding (1956, 1957), dealt with Suriname prawns from an economic viewpoint and discussed the fishery of these animals (see under *Xiphopenaeus kroyeri* and *Palaemon schmitti*); also Dr. D. C. Geijskes published two papers (1948, 1954) on this subject. A survey of the Suriname prawn fishery was given by Lindner (1957, p. 153).

IV. Collectors. The scientific papers dealt with in paragraph II are based on material collected by various persons, to whom science is much indebted for making this material available to scientists. The importance of the rôle played by collectors is often underestimated, and in several cases even their names are unknown. It seems therefore only fair to include in this chapter on the history of Suriname carcinology a paragraph dealing with the known collectors of Suriname Decapoda and their activities; the enumeration given here is in a chronological order.

Carl Gustaf Dahlberg (born Nyköping, Sweden, 1721, died Paramaribo, 6 September 1781) was of Swedish nationality and in 1743, during the Finnish war, served as a gunner in the Swedish army; in the same year he took part in the defense of Stockholm during the Dalecarlian revolt. He went to

Suriname as a corporal in the Dutch forces, arriving there probably in the end of 1746. He was accompanied by two other Swedes and was extremely poor: he boasted later that two small silver coins were all the money in his possession when entering Suriname. Nevertheless he seems to have had a letter of recommendation (dated 7 September 1746) from the directors of the "Suriname Society" of the Dutch West India Company to the Governor General of Suriname, J. J. Mauricius. On 3 May 1748 Dahlberg was promoted to the rank of sublieutenant; he left the service on 1 March 1752. When in Suriname he married, 13 March 1751, Johanna Catharina Bedloo, the rich widow of captain C. Brouwer, who was characterized by Governor General Mauricius as an impudent shrew, "een der impertinente helleveegen". By his marriage Dahlberg became the owner of the plantations Brouwershaven with about 100 slaves situated on the Perica Creek, and Carlsburg with about 40 slaves on the Cottica River. He owned these plantations till his death; Teenstra (1835, pp. 54, 58) noted that in 1830 both plantations were abandoned. Dahlberg became one of the wealthiest citizens of Suriname, and from 19 November 1753 to 5 February 1754 (before his departure for Europe) he occupied the important post of "Raad van Policie en Crimineele Justitie" (Councillor of Police and Criminal Justice). His military rank eventually was that of "overste-luitenant" (lieutenant-colonel). On 20 April 1754 Dahlberg left Suriname to visit Sweden, and when he returned on 21 June 1755, he took Daniel Rolander (see below, p. 19) with him. During this first visit to Europe Dahlberg had left his wife in Suriname. On 25 April 1761 he left Suriname for a second time, now accompanied by his wife and two children. They visited Holland and Sweden; in Stockholm their third child was born. The family returned in Suriname on 20 March 1765. On 11 May 1771 Dahlberg and his wife departed from Suriname for a third trip to Europe. They stayed in Amsterdam, where they were visited in December 1774 and January 1775 by the Swedish traveller J. J. Björnsthål (see Björnsthål, 1782, p. 229, footnote; 1783, pp. 408, 434, 448). They returned in Suriname 9 July 1775, and did not leave the country again. Dahlberg died in the afternoon of 6 September 1781 in Paramaribo. At that time he lived in the Heerenstraat, one of the mainstreets of the town, where he had rented a rather expensive house. His wife died 29 July 1803. Dahlberg was much interested in natural history and made extensive zoological and botanical collections, which, when visiting Sweden in 1754, he donated to King Adolf Fredrik. Also in 1762 he brought collections to Sweden, probably including the type material of *Cancer cordatus* which Linnaeus described in 1763; this material was donated to King Gustaf III and contained among other things 186 species of plants preserved in spirit. Dahlberg's zoological specimens that

found their way to the cabinet of King Gustav IV Adolf of Sweden (including the 1754 donation to King Adolf Fredrik) are at present preserved in the Zoological Institute of Uppsala University (see Holm, 1957, pp. 47, 49). Dahlberg also appears to have donated Suriname material to the Empress Catherina of Russia, who in 1763 presented these specimens to the St. Petersburg Museum (see Brandt, 1864, p. 12, and Penard, 1925, p. 153). When Dahlberg lived in Holland from 1771 to 1775 he evidently had a new collection of Suriname material, as Björnsthål, who in 1775 stayed with the Dahlbergs in Amsterdam, wrote (1783, p. 434): "Bij onzen waarden landsman, den heer overst-luitenant Dalberg . . . bezag ik zijne voortreffelijke verzameling van merkwaardige zaaken uit Amerika" (at the home of our worthy compatriote, lieutenant-colonel Dahlberg, I examined his excellent collection of curiosities from America). Dahlberg is far better known as a botanical than as a zoological collector; so Linnaeus devoted several papers to his plant collections (e.g., *Plantae Surinamenses*, 1775) and named the botanical genus *Dalbergia* for him. In pharmacology Dahlberg's name will always be connected with the introduction in Europe of the *Lignum Quassiae*, an antifebrine made from the wood of *Quassia amara* L. Dahlberg has become somewhat notorious because of a story which circulated about this maltreatment of a negro-slave named "Baron" (see Stedman, 1796, vol. 1, p. 84, vol. 2, p. 349). It was said that Dahlberg had educated Baron and promised him freedom, only to break this promise later by selling Baron as a slave to another person. Baron then should have refused to do any more work, and after having been publicly flogged for his obstinacy, escaped to the woods, where he soon became the leader of a group of negro-rebels. Baron was said to have vowed bloody revenge against Dahlberg. Dahlberg resented this story very much and went so far as to publish an official denial in the weekly "Surinaamsche Courant" of 25 October 1775 (see Oudschans Dentz, 1916). Much of the above information concerning Dahlberg is taken from the account by Sack (1911), who evidently made a thorough search of the Suriname archives for his most interesting study of the negro Quassie, the discoverer of *Quassia amara* L.; in Sack's paper three full pages are devoted exclusively to Dahlberg.

Daniel Rolander (born in Småland, Sweden, 1725, died Lund, Sweden, 1793) studied at the University of Uppsala and was a pupil of Linnaeus; he became the private tutor of Linnaeus's son. The fact that he "im Linnänschen Hause, seit Löfflings<sup>1)</sup> Zeit, auferzogen war und sich ganz auf die Insektenkunde gelegt hatte" (Afzelius, 1826, pp. 57, 58), shows that Lin-

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1) The botanist Löffling, also a pupil of Linnaeus, went to Spain in 1751 on Linnaeus's recommendation.

naeus must have had great confidence in him. During the ten years of his stay in Uppsala Rolander published several entomological papers. On Linnaeus's request he joined Dahlberg on his return voyage to Suriname in 1755. Rolander's trip was financed partly by Linnaeus, partly by the well known Swedish entomologist baron Carl de Geer. One of the instructions given by Linnaeus to Rolander was to try and send living specimens of the Cochineal insect to Sweden. On 21 October 1754 Rolander left Uppsala and went overland to Amsterdam, whence he and Dahlberg sailed for Suriname, arriving at Paramaribo 21 June 1755. During his stay in Suriname Rolander made many collecting trips in the neighbourhood of Paramaribo and also went up the Commewijne River. The unrest caused by the revolt of the escaped negro slaves prevented him from penetrating deeper into the interior of Suriname. He seems to have given most of his attention to Suriname botany, but he made also zoological collections. The climate did not agree too well with him and his health was undermined by fever, while furthermore his condition was made worse by the fact that according to the then prevailing custom in Suriname he had to drink more alcoholic beverages than he was used to in his home country. Later, because of his poor health, he could not find the strength to get rid of the drinking habit. After a stay of slightly more than half a year Rolander left Suriname on 22 January 1756 and sailed for the island of St. Eustatius (Netherlands Antilles), where he arrived on 23 February of the same year. He stayed 10 days at St. Eustatius, which he used for bringing together botanical collections. Via Amsterdam he reached Stockholm on 2 October 1756. Reportedly, Rolander's collections were very fine, while in his diary he had made many careful notes. How the Cochineal project went wrong was told by Afzelius (1826, p. 59): "Jun. 29 [1756]. Rolander auf der Heimreise von Surinam, schickte Cactus mit Cochenillen in einem Topfe. Aber Linnäus präsidirte, und der Gärtner nimmt die Pflanze heraus, putzt alle Unreinigkeit ab, folglich auch die Würmer, und setzt sie in einen andern Topf, so dass, obgleich die Würmer glücklich lebend ankamen, sie doch im Garten vergingen, ehe Linnäus sie zu sehn bekam. Folglich verschwand alle Hoffnung, diese Thierchen, von denen man glaubte, dass sie mit Vortheil in der Orangerie gezogen werden könnten, jemals zu erlangen. Dies griff ihn [Linnaeus] so an, dass er einen der schwersten Paroxysmen der Migraine erdulden musste". We do not know whether or not Rolander blamed Linnaeus for the loss of his Cochineal insects, but it is certain that the friendship between the two was ended when Rolander came back in Sweden: "Rolander, dieser undankbare Schüler, gab dem Linnäus nichts von allen seinen Sammlungen, im Gegentheil verläumdete er ihn allenthalben" (Afzelius, 1826, p. 59). Also Hornemann (1812, p. 16) re-

ported that Rolander kept most of his collections for himself during his stay in Sweden; he only gave some objects to assessor Bergius and sold part (or all?) of his insects to Baron de Geer. The plants collected by Rolander at St. Eustatius seem to have reached Linnaeus by way of De Geer, since Linnaeus wrote "Rolander sammelte auf den Inseln bei Amerika eine grosse Menge seltener Gewächse, die er an den Hofmarschall De Geer gab, und welche dieser an mich schenkte" (Afzelius, 1826, p. 230). After a stay of some years in Sweden Rolander went to Copenhagen. Here he sold his herbarium to professor Friis Rottböll and his Suriname diary to professor Kratzenstein, who in vain tried to get it published. Rolander's Suriname herbarium now forms part of the Copenhagen Herbarium. His diary, which bears the title "Diarium Surinamense, quod sub itinere exotico conscripsit Daniel Rolander" is kept as a manuscript in the Botanical Central Library at Copenhagen, and consists, as Mr. M. Skytte Christiansen was so kind to inform me, of a big volume in folio of about 700 pages closely written in latin. From Copenhagen Rolander went to Landskrona on the Swedish coast of the Sound, where general-major Strussenfeldt and a certain Mr. Schau took care of him. Strussenfeldt instructed him to make an inventory of the animals and plants of the island of Hveen in the Sound, but the list produced by Rolander was of very poor quality. After the death of Schau and the departure of Strussenfeldt, Rolander went to Lund, where he lived, ill and in greatest poverty, till his death in 1793. Most of the above data on Rolander are taken from Hornemann's (1812) biography of this naturalist.

Hendrik Haagen Dieperink (born Hoornaar, province of South-Holland, 10 April 1794, died Amsterdam, 18 May 1842) was the son of a Protestant minister and became about 1816 a military apothecary in Paramaribo. Between June 1824 and April 1836 Dieperink sent at least 13 consignments of preserved and living animals to the Rijksmuseum van Natuurlijke Historie at Leiden. Extensive lists of these consignments are still preserved in the archives of the Museum. In only two of them Crustacea are mentioned. Among the material sent on 24 May 1825 are listed: 4 specimens of the "waterkrab (zeeserika)" (= *Callinectes bocourti*), 3 "kreeften . . . Cancer Pennaceus" (= *Penaeus* sp.), 2 "Garnalen Sarrasarras" (= *Xiphopenaeus kroyeri*?), 3 "postelijn krabben" (porcelain crabs, identity unknown), and 2 "duivelskrabben" (= *Uca maracoani*). The other consignment was sent 1 April 1827 and contained the following Crustacea: 2 "gewoone krappen, Cancer Cordatus" (= *Ucides cordatus*), 2 "zeekrappen Cancer an? depurator" (= *Callinectes bocourti*), 1 "moeraskrap, Cancer an. Uca?" (marsh crab, identity unknown), 4 "kleine krabbetjes . . . Cancer an. Vocans?" (= *Uca* spec.), 3 "vierkante krabben" (= *Goniopsis cruentata*), "een Surinaamsche

kreeft en onderscheidene Surinaamsche kreeftgarnalen" (a Suriname crayfish and several Suriname lobster-prawns; possibly *Macrobrachium carcinus* and *M. amazonicum*). Dieperink was a conscientious collector and tried to preserve his animals in the best possible condition. It is interesting to note his experiments for preserving the colour of crabs, mentioned by him when listing the above "vierkante krabben": "Tot bewaring van de kleur heb ik beproefd de spiritus met een mucilage G. arabicu te vermengen om daardoor de spiritus met die slijm verbonden zijnde, dezelve voor de oplossing van de kleur ongevoeliger te maken. — Het komt mij voor dat deze wijze bij eene nadere beproeving en bepaling van de hoeveelheid mucilage en spiritus en derzelve sterkte zeer wel boven alle andere hiertoe reeds beproefde middelen zal voldoen" (for the preservation of the colour I have tried to mix the spirit with a mucilage of gum-arabic, in order to make the spirit less capable of dissolving the colour. I believe that this method, when the correct quantities and strength of the mucilage and spirit have experimentally been determined, may be more satisfactory than the methods employed thus far). By way of experiment Dieperink had preserved two of the crabs in this mixture of spirit and gum-arabic and one in pure spirit. Dieperink's work on behalf of the Leiden Museum was much appreciated and on 26 January 1831 he received a golden medal from the government as a token of recognition for what he had done. C. J. Temminck, the director of the Leiden Museum, tried to persuade the Netherlands government to grant Dieperink the title of "Ridder in de Orde van de Nederlandsche Leeuw" (Companion of the Order of the Netherlands Lion) for the unselfish way in which he enriched the collections of the Museum. Evidently Temminck was successful, since in the announcement of Dieperink's death this title was annexed to his name. When in April 1836 Dieperink returned to Holland, his departure from Suriname was deeply regretted by Temminck, who wrote in a letter of 1 August 1836 to the Minister of Internal Affairs that it was a great loss to the Museum "dat zulk een ijverig verzamelaar het vruchtbaar oord zijner nuttige werkzaamheden heeft verlaten en tevens [ontstaat] de gegronde vrees, dat hij derwaarts niet zal wederkeeren en dus voor de belangen van het Museum, dat hem zooveele verplichtingen heeft, en waarvoor hij nog zoveel had kunnen verrigten, voortaan als verloren te achten is" (that such an industrious collector has left the fertile region of his useful occupations, while at the same time there exists the well founded fear that he will not return there and consequently must be considered lost for the interests of the Museum which owes him so much and for which he could have accomplished still more). As pointed out in paragraph II, De Haan and De Man made mention of some of Dieperink's Decapoda, but the collection as a whole has not been studied. At present only

a small portion of Dieperink's original Decapod collection is still in existence, most of the specimens having become lost in the century since their arrival in Leiden.

Constantin Hering (born Oschatz, Germany, 1 January 1800, died Philadelphia, U.S.A., 23 July 1880) studied medicine in Dresden, Leipzig, and Württemberg, Germany, and obtained his doctor's degree on 23 March 1826. After having been a teacher for a few months, at the end of 1826 or the beginning of 1827 Hering was sent by the government of Saxony to Suriname in order to collect natural history objects. On this trip he was accompanied by the botanist Weigel, who died rather soon after their arrival. Hering was one of the champions of the homeopathic method in medicine and practised this method in Suriname. An order by the king of Saxony telling Hering to leave medicine alone and to concentrate exclusively on the collection of natural history specimens, made Hering resign from his job with the Saxonian government. Now he settled as a physician in Suriname, where he stayed till the beginning of 1833, when he left for the U.S.A. to live in Philadelphia where he soon had a large practice. Till his death in 1880 Hering remained in Philadelphia but for two periods: (1) a brief stay at Allentown, Pa., where in 1835 he became the president of the short lived "North American Academy of the Homeopathic Healing Art", and (2) a seven year's stay (1845-1852) in Germany. Hering is generally considered the founder of American Homeopathy, and the Hering Institute of Chicago, founded in 1892, was named after him. When in Suriname, Hering at first did not have much success with the preservation of the material which he sent to Germany: "De Heer C. Hering is met de door ZijnEd. aan het Saxische Gouvt. toegezonden voorwerpen wat de conservatie betreft niet bijzonder gelukkig geslaagd" "Zeer veel schoone en zeldzaame voorwerpen zijn . . . bij den Saxische Naturalist C. Hering bedorven en geheel verloren gegaan" (letters, respectively of 20 April and 15 August 1828, written by Dieperink to Temminck, present in the archives of the Leiden Museum). There was a certain amount of rivalry between Dieperink and Hering as far as collecting of zoological specimens was concerned. Dieperink (in a letter of 15 September 1828 to H. Schlegel) complained that Hering, because of his activities as a doctor, was in a position to obtain specimens which were unavailable to others ("ofschoon ZijnEd. betrekking van Med. Doctor hem meermalen die belangrijke voorwerpen verschaft, welke men op geene andere wijze van deze of geene kan magtig worden"). Notwithstanding this slight rivalry, the relation between Dieperink and Hering seems to have been quite good: this not only appears from the fact that in 1831 and 1832 both served in a Committee for the study of the Cochineal (see Teenstra, 1835, pp. 307,

326), but also became evident, when once Dieperink had obtained a male specimen of a species of ray, while Hering received what he thought to be a female of the same species, Hering presented his specimen to Dieperink since "ZijnEdG. achtte het te belangrijk voor de Wetenschappen, dat deze twee zeldzaame ex. bijzondere visschen van elkander zouden gescheiden worden, en vond alzo goed, mij dezelve voor de medetoezending aan 's Rijksmuseum der Nederlanden aan te bieden. Welke edele Aanbieding door mij geenszins is van de hand geslagen" (he thought it too much in the interest of science not to separate these two rare specimens of curious fish, and therefore consented in giving me his specimen to have it sent to the Leiden Museum. This noble offer of course was not declined by me) (letter of 20 April 1828 by Dieperink to Temminck). We do not know whether Hering sent many Decapods to Saxony: the only Suriname material mentioned by Thallwitz (1892) in his list of the Decapoda of the Dresden Museum is *Pericera cornuta*, the collector of which is not mentioned. Of the utmost importance, however, is the Suriname Decapod collection sent by Hering to the Philadelphia Academy of Natural Sciences, where this material according to Fowler (1919, p. 129) was received about 1830. Randall published in 1840 on this material, describing four new species (see paragraph II, p. 13). Kingsley (1880, p. 202) mentioned a specimen from Hering's Suriname collection (*Planes minutus*), which had not been dealt with by Randall. Part of Hering's Crustacea are still preserved in the Philadelphia Museum; these are listed in the present paper. Hering's association with the Philadelphia Academy of Natural Sciences dates from as early as October 1826, when he was elected a correspondent of the Academy; when Hering settled in Philadelphia he became a member and was so till his death, which was announced in the meeting of the Academy of 27 July 1880 (Proc. Acad. nat. Sci. Phila., 1880, p. 330). A biographical sketch of Hering has been published by Oudschans Dentz (1930).

Jeffries Wyman (born Chelmsford, Mass., U.S.A., 11 August 1814, died Bethlehem, New Hampshire, U.S.A., 4 September 1874) graduated from Harvard College in 1833 and obtained his M.D. degree in 1837. In 1843 he became professor of anatomy and physiology at Hampden-Sidney College in Virginia, obtaining in 1837 a similar position at Harvard College. Apart from being a well known anatomist, he was the leading American anthropologist of his days. He made several trips within the U.S.A. and abroad (Labrador, S. America, Europe). In 1856 he visited Suriname with two of his pupils. Among his Suriname collections there are two specimens of a species of freshwater crab, which Rathbun (1905, p. 291) described as new and dedicated to Wyman by giving it the name *Pseudothelphusa wymani*. One of the

types is preserved in the Museum of Comparative Zoölogy at Harvard College, the other is in the U.S. National Museum, Washington, D.C. It is not known whether Wyman collected any other Decapoda during his stay in Suriname.

C. F. Kraepelin and H. Holm, who both were members of the board of the community of Moravian Brethern at Zeist, the Netherlands, around 1862 presented to the Rijksmuseum van Natuurlijke Historie at Leiden collections made by missionaries of the community in Labrador, Greenland, and the West Indies. Among this material there were four Crustacea which may have included the specimens of *Macrobrachium amazonicum* from Suriname mentioned in the present paper (p. 87). Later the Leiden Museum bought more material from Kraepelin and Holm, but no details as to the species contained in it are available.

Heinrich Benno Möschler (1831-1888), "Gutbesitzer am Kronförstchen bei Bautzen", Germany, did not collect in Suriname himself but received Suriname material "durch die Gefälligkeit zweier Freunde, welche in Surinam als Missionäre angestellt sind" (Möschler, 1878, p. 293). One of Möschler's collectors lived at a "Station, welche etwa 25 geographische Meilen im Innern gelegen ist" but was later transferred to Paramaribo where the other collector lived also. According to Horn & Kahle (1936, p. 180) Möschler sold insects, part of which reached the Berlin Museum. It is possible that the Berlin material of Suriname Decapoda was obtained from Möschler at the same time as the insects.

Christiaan Johannes Hering (born Paramaribo, 28 August 1829, died Paramaribo, 30 May 1907) was the son of Dr. Constantin Hering (see above, p. 23) by his first marriage (with Charlotte Kemper of Paramaribo). When Constantin Hering in 1833, after the death of his wife, left Suriname for the U.S.A., he entrusted the care of his son to his wife's relatives in Paramaribo. C. J. Hering joined his father one year later, when the latter had settled in Philadelphia. He went to school in the U.S.A. and Germany. In 1844, when his father went to Europe, C. J. Hering left the U.S.A. to visit his relatives in Suriname. He stayed there till 1848, when his father ordered him home to finish his studies. During his 1844-1848 stay in Suriname Hering, who had inherited his father's vivid interest in natural history, learned to mount animals and made natural history collections for a French Museum; in the same period he got a training which made him thoroughly acquainted with various aspects of Suriname agriculture. In Philadelphia he soon gave up his studies and in December 1849 we find him back in Suriname, where he occupied himself with various agricultural projects. In 1855 he made a visit to the United States in order to improve his knowledge of

tropical agriculture, returning the same year to Suriname. The Suriname government appointed him director of one of the government plantations, and when in 1863 all government plantations were sold, Hering acquired a private plantation. In 1872 he sold this plantation and accepted a government position in the Suriname Finance Department, from which he was pensioned in 1898. He lived for about 13 years in Coronie, afterwards, in 1900, returning to Paramaribo. Hering published several books and papers on tropical agriculture and on distillation, but he was also interested in archeology (he once made an expedition to the interior of Suriname for the investigation of old Indian inscriptions), meteorology, and natural history. Between 1882 and 1899 he sent several shipments of zoological specimens to the Leiden Museum. In September 1855 he was elected a non-resident member of the Philadelphia Academy of Sciences, which he presented on several occasions with natural history objects. In a letter dated Paramaribo 4 June 1883 and addressed to H. Schlegel, Hering wrote that since 1856 he was a correspondent of the Smithsonian Institution and that he had often sent collections of butterflies, etc., to their Museum. Oudschans Dentz (1930) published a biography of Hering.

Herman Frederik Carel ten Kate (born Amsterdam, 21 July 1858, died Carthage, Tunisia, 4 February 1931) was a well known ethnologist and anthropologist, who studied at the universities of Leiden, Paris, Berlin, and Heidelberg, obtaining his doctor's degree at the last-named university in 1882. Ten Kate travelled extensively in all parts of the world. He visited Suriname from 13 June 1885 to 19 February 1886, making extensive trips throughout the coastal region. He followed the Marowijne up to the Armina Falls and returned to Paramaribo via the Wane Creek and the Cottica River, collected zoological material in the region of the Upper Cottica River and Patamacca Creek, went up the Suriname River to Berg en Dal, explored the Upper Para region, followed the Saramacca River to Mariposton, spent some time in Coronie, and after going up the Coppename went via the Waijombo and Nickerie Rivers to the Corantijn River which he followed up to Oreala. Zoological collecting was done also in the neighbourhood of Paramaribo. An account of Ten Kate's stay in Suriname is given in *Tijdschr. Nederl. aardrijksk. Gen.*, ser. 2 vol. 3 (1886), pp. 92-97, 706-710. The zoological collections made in Suriname were donated by Ten Kate to the Rijksmuseum van Natuurlijke Historie at Leiden. De Man (1892) and Tesch (1917) dealt with Suriname crabs of this collection. An obituary notice of Ten Kate was published by Steinmetz (1931).

John H. Spitzly was an army surgeon with the Dutch forces at Paramaribo; during his stay in Suriname he collected zoological specimens (mostly insects,

but also vertebrates, parasitic worms and at least one crab). Several times between 1885 and 1892 the Rijksmuseum van Natuurlijke Historie at Leiden received material from him. Spitzly, notwithstanding his name which would suggest that his nationality was Swiss, seems to have been an Englishman; his letters are written in perfect English, and after leaving Suriname between 1892 and 1898 he settled in London. Between September 1898 and March 1900 Spitzly was repeatedly mentioned in the reports of the Leiden Museum as Mr. J. H. Spitzly of London. When in Suriname, Spitzly collected near Paramaribo and also near Berg en Dal on the Upper Suriname River. During his London period he sent material from Asia and Europe to the Leiden Museum. After 1900 no more mention of Spitzly is made in the reports and correspondence of the Leiden Museum.

Miss M. Koning collected zoological specimens near Paramaribo. In 1894 the Leiden Museum received material (insects, crustaceans, amphibians, and reptiles) from her; at that time her address was given as Paramaribo. In September 1900 an additional collection of Suriname insects was received; Miss Koning then lived in The Hague. I have not been able to obtain further particulars.

Of W. Gillespie hardly any data are known. His Suriname material of *Sesarma rectum* Randall was found unidentified in the collection of the Museum of University College of Dundee when this collection was transferred to the British Museum in 1955. Possibly Gillespie also collected the Suriname material which was mentioned by d'Arcy W. Thompson in his 1901 catalogue of the Crustacea of the Dundee Museum. However, no certainty can be obtained in this respect. In his paper, Thompson mentioned neither the *Sesarma* specimens nor did he cite Gillespie as a collector. Furthermore the Suriname material enumerated by Thompson seems to have become lost in the course of time and can no more be traced.

Julius Michaelis was a dealer of insects in Berlin. According to Horn & Kahle (1936, p. 176) he obtained Suriname material in 1898/1899. The Suriname Crustacea in the collections of the Berlin and Hamburg Museum marked Michaelis evidently formed part of this material.

D. G. J. Bolten (born The Hague, 5 April 1871) studied pharmacy at Leiden University (1893-1897). From 1 November 1898 to 31 May 1900 Bolten was curator of the Colonial Museum at Haarlem, and on 1 June 1900 he became a military apothecary. In this function he stayed in Suriname from 3 October 1902 to May 1910, returning afterwards to the Netherlands. He retired 1 June 1933. Bolten collected mainly insects, but also Crustacea were presented by him to the Leiden Museum. In a letter of 12 October 1921 he stated that he collected mostly "in de naaste omgeving van Para-

maribo (op vrije zondagen om de 14 dagen)" (in the close neighbourhood of Paramaribo on my Sundays off, every other week). Other localities where Bolten made collections were the plantation "Belwaarde" on the Suriname River opposite Paramaribo, the plantation "Marienburg" on the southern bank of the Commewijne River, Albina on the Marowijne River, Groningen on the Saramacca River, and Maábo on the east bank of the upper Saramacca.

Pieter Buitendijk (born Leiden, 8 December 1870, died Leiden, 11 April 1932) studied medicine at Leiden University, starting his studies in September 1889. After having obtained his degree, Buitendijk became a ship's surgeon, making, between 1900 and the end of 1930, about four trips a year from Holland to the Netherlands East Indies and back. Usually these voyages took place via the Suez Canal, but because of World War I, the ships were rerouted around the Cape of Good Hope during 1916-1919; in 1917 and 1918 Buitendijk did not return to Holland but made voyages in the Pacific (China, Japan, Hawaii, San Francisco). Around 1901, in 1903, and in 1905 Buitendijk visited the West Indies. On practically all of his trips he made extensive collections, mainly of fishes and marine invertebrates, but also of many other groups; these collections were donated by him to the Rijksmuseum van Natuurlijke Historie. His West Indian material is insignificant as compared to the extremely rich collections from the East Indies; they contain only very few Suriname specimens. Buitendijk himself was especially interested in fishes, to the study of which he gave much of his time spent in Holland; the fact that he died rather soon after his retirement probably explains why he did not publish any zoological papers. He is the father of Alida M. Buitendijk, who from 1930 till her death in 1950 belonged to the staff of the Leiden Museum, in 1938 being entrusted with the care of the Crustacean collections.

Marius Dirk Horst (born Utrecht, 19 April 1879, died Leiden, 27 October 1958) was a son of Dr. Rutgerus Horst, who from 1882 till 1923 was curator of Invertebrates (exclusive of Insects and Molluscs) of the Rijksmuseum van Natuurlijke Historie at Leiden. M. D. Horst studied medicine at Leiden University, completing this study in 1905. He then became a ship's surgeon, and in this function made two voyages to the West Indies. On these trips, in 1907, he collected zoological material in Suriname, Venezuela, and Haiti, donating it to the Leiden Museum. His Suriname material, which consists of fishes and Crustacea, came from the neighbourhood of Paramaribo. After a few years as a doctor at a sanitarium in the Netherlands, Horst left for the East Indies in 1909 and stayed there till about 1915. From 1917 till 1920 he was lecturer in tropical medicine and assistant (later curator) at the Pathology Laboratory of Leiden University. 1 January 1921 he be-

came the director of the Medical and Health Department of the city of Leiden, a post which he occupied till his retirement in 1945. In November 1921 Horst obtained the doctor's degree at Leiden University. The crabs collected by Horst have been studied by Tesch, who in his 1917 paper dealt with the specimens of *Sesarma* of this collection.

C. Heller, who was of German nationality, was a missionary of the Lutheran Community of Moravian Brethern and between 1908 and 1910 was stationed in Suriname. Here he collected Crustacea in the Upper Saramacca River, near Paramaribo, in the mouth of the Suriname River, in the Para District, in the Upper Suriname River near Berg en Dal, in the Upper Commewijne River, and near Albina. His material was sold to the Zoological Museums of Berlin and Hamburg.

Jhr. Willem Cornelis van Heurn (born The Hague, 20 February 1887) studied biology at Leiden University finishing in 1923. From 29 May till 22 October 1911 Van Heurn visited Suriname, where he made extensive zoological collections for the Leiden Museum. Large series of marine and fresh water Crustacea were collected by him, mostly in the neighbourhood of Paramaribo, but also near Coronie, Groningen, Guyana Goud Placer, along the Commewijne, and near Albina. These collections are especially valuable because of the extensive series collected and of the careful way of preservation. In 1913, and from 1919 to 1939 Jhr. van Heurn stayed in the Netherlands East Indies (in 1913 as a member of an expedition to Simalur, from 1919 to 1932 as a zoologist of the Buitenzorg Institute of Plant Diseases, and from 1932 to 1939 as a biology teacher). He returned permanently to the Netherlands in 1939. Part of the Suriname Decapoda collected by Van Heurn have been reported upon by Tesch (1917) and Holthuis (1948, 1950a, 1952).

Assueer Jacob Baron Schimmelpenninck van der Oye (born Nijkerk, 17 February 1872, died Lochem, 26 July 1945), correspondent of the Netherlands Bank, was the son of Assueer Jacob Baron Schimmelpenninck van der Oye (born The Hague, 13 April 1835; died Paramaribo, 21 August 1915), who after having been burgomaster of the Netherlands town of Nijkerk, became administrator of the Finance Department of Suriname. Between October 1913 and March 1914 several lots of molluscs collected in Suriname were received by the Rijksmuseum van Natuurlijke Historie at Leiden as a gift from either the elder or the younger Schimmelpenninck van der Oye. Among these shells one hermit crab from near Paramaribo was found.

Adriaan Reyne (see under paragraph II, p. 16), in 1922 collected *Macrobrachium jelskii* in trenches of the Experimental Garden of the Department of Agriculture in Suriname. The specimens were sent for identification to

the U.S. National Museum, Washington, D.C., where they are still preserved. Both Reyne (1923) and Holthuis (1950a, 1952) reported upon this material. In the spring of 1920 Reyne made a trip to the Avanavero Falls in the Kabalebo River (Corantijn basin), where crabs were collected.

Ivan Terence Sanderson (born Edinburgh, Scotland, 30 January 1911) obtained his B. A. degree at Cambridge University in 1931. Between 1927 and 1940 he undertook one round-the-world trip (zoological collecting in Indonesia), and six scientific expeditions (one to West Africa, the others to the West Indies, Central and South America) during which zoological material was collected for the British Museum and other institutions. The third of these scientific expeditions, which was undertaken on behalf of the British Museum, was to Suriname; the personnel consisted of Sanderson himself, his wife and an assistant. The party stayed in Suriname from the beginning of January to December 1938. After spending about a month in Paramaribo making preparations for trips into the interior, the expedition went up the Coppename River by small motor launch to near Kaaimanston, where it stayed several months. After its return to Paramaribo the expedition almost immediately started a trip up the Para River and Coropina Creek to Zanderij. The next trip was to the region of Donderberg where some months were spent at the abandoned site of the Van Emden mining company at about six miles east of the railroad at 91.5 km S. of Paramaribo. Crustacea were collected near Paramaribo, near Kaaimanston, and near Donderberg. After having served in World War II, Sanderson entered the British Ministry of Information and later the British Foreign Office. In 1947 he organized his own business in New York — Ivan Sanderson Inc. — for "Natural History in its widest sense". Sanderson is well known to the general public for his popular and juvenile books, his articles in various magazines, and for his radio and television series. His book "Caribbean Treasure", describing his Suriname expedition, proved a best seller and is now published in nine languages. Sanderson also published scientific papers, e.g., on the mammals of Suriname.

Hermanus Willem Christiaan Cossee (born Leiden, 29 May 1914), who since 15 March 1935 is a technician in the division of birds of the Rijksmuseum van Natuurlijke Historie at Leiden, visited Suriname from 26 February till 9 April 1939. He collected zoological material for the Leiden Museum, mainly in the neighbourhood of Paramaribo. Some of the *Macrura* collected by Cossee have been mentioned by Holthuis (1952).

Lodewijk Juliaan Schmidt (born Gansee, Suriname, 1 May 1898) took part, usually as a foreman, in several expeditions to the southern border region of Suriname, namely in three expeditions under vice-admiral C. C.

Käyser (1935-1937), in one under Father G. W. M. Ahlbrinck to the Oelemarie in 1938, and in one under Dr. D. C. Geijskes to the Litani in 1939. Furthermore he went three times (1940, 1941, 1942) by himself to this region for a census of the Oajana and Trio Indians (see Schmidt & Stahel, 1942), and accompanied Dr. Geijskes in 1943-1944 on his trip to the Upper Coppename. Schmidt also took part as a foreman in the 1948-1949 Suriname Expedition. In 1949 he entered the Suriname Forest Service and in 1954 was appointed superintendant of the local government in the Suriname River district. Schmidt collected Crustacea near the Tafel Mt., and at various localities on the Upper Suriname River (Mamadam, Gingré Soela, and Bakra Oposton).

Antoine Maria Hubert Hermans (born Brunssum, the Netherlands, 2 March 1907) studied at the Polytechnical College of Delft, the Netherlands, where he obtained his degree of mining engineer. In 1937 Hermans went to Suriname in the service of the Sara Creek Mining Co. of which he is now the head. This company, after having worked first at the Sara Creek, a branch of the Suriname River, has now moved its activities to the Lawa River (Upper Marowijne basin) near Benzdorp. The Rijksmuseum van Natuurlijke Historie possesses Decapod material collected by Hermans in the Sara Creek.

Dirk Cornelis Geijskes (born Kats, province of Zeeland, 16 May 1907) studied biology at Leiden University and obtained his doctor's degree at the University of Basel, Switzerland, in 1935. He was appointed entomologist of the Agricultural Experiment Station of Suriname, and arrived in Paramaribo March 1938. In 1952 Geijskes became Government Biologist of Suriname, a post which he occupied till 1954 when he was appointed Director of the Surinaams Museum in Paramaribo. Crustacean material was collected by Geijskes on experimental fishing trips off the Suriname coast, in many localities in the coastal area of the country (Nickerie, mouth of the Suriname River, region of Paramaribo, many localities between Paramaribo and Kabel, mouth of the Warappa Creek), and during numerous expeditions into the interior of Suriname: to the upper reaches of the Litani River, June-September 1939 (cf. Geijskes, 1942, 1957), to the region of the Upper Coppename River, 5 July 1943-20 January 1944 (cf. Geijskes, 1946), various trips up the Marowijne and Tapanahoni Rivers and to the southern border region (1952, 1953, 1954), to the upper reaches of the Coppename River, 1957, and to the Tafel Mt., 1958. Furthermore Geijskes was the leader of the 1948-1949 Suriname Expedition (see p. 39) and of the 1952 Medical Expedition (see p. 40). Special attention was given by Dr. Geijskes to economically important species, but other forms also were intensively collected by him.

Though Dr. Geijskes's main interest is with the insects (he himself is a specialist of the Odonata), his Crustacean collections are considerable and form by far the larger part of the Suriname material on which the present paper is based, apart from the "Coquette" collection. All Dr. Geijskes's material is preserved in the Leiden Museum, duplicates are in the Surinaams Museum.

François Haverschmidt (born Utrecht, 21 June 1906) studied law at Utrecht University. After obtaining his degree Haverschmidt obtained a position with the Dutch courts of justice. In 1946 he went to Suriname where he first became a member, later the president of the court of justice. When still in the Netherlands, Haverschmidt was one of the foremost ornithologists of the country and at present he is the best authority on Suriname birds. Remains of Decapoda found in the stomach contents of Suriname birds were sent by Haverschmidt to the Rijksmuseum van Natuurlijke Historie for identification.

Jan Christiaan Lindeman (born Zutphen, 26 June 1921) studied biology at Utrecht University (1940-1948), obtaining there his doctor's degree 19 January 1953. Since 1946 he is a member of the staff of the University Institute of Systematic Botany in Utrecht. He took part as a botanist in the 1948-1949 Suriname Expedition, and from March 1953 to March 1955 made a second visit to Suriname. During this second stay in Suriname he occupied himself with forest research and worked mainly in the region between Joden-savanne and the Mapane Creek, but also in the region W. of the mouth of the Coppename River, at the confluence of the Coppename and Waijombo Rivers, at the Upper Coppename River near Bitagron, at the Jandé Creek in the Upper Suriname River basin below Kabel, in the region of Moengo, and in the Nassau Range. Crustacea were collected by Lindeman W. of the Coppename mouth and near Suhoza on the Upper Suriname River.

Christiaan Bleys (born 's-Hertogenbosch, 23 December 1918) studied geology at Utrecht University, and from 9 April 1949 to 20 April 1954 was a field geologist with the Service of Geology and Mining in Suriname. Afterwards he left for Australia, where he obtained a position as geologist. In Suriname Bleys collected Crustacea in the bush creeks flowing down the Browns Mt. near the railway about 121 km S. of Paramaribo.

Robert Marie Joseph Wirtz (born Paramaribo, 25 March 1921) was a technician of the Fisheries Service in Suriname from 9 May 1949 until 1 June 1954; he collected Decapod Crustacea which were sent for identification to the Leiden Museum. Later Wirtz left Suriname for Canada.

E. C. Stoll is a dealer of living animals in Leiden, who specializes in tropical fish. At several occasions Stoll presented fish material to the Leiden

Museum, and once provided living specimens of *Palaemonetes carteri* from Suriname.

Conrad Friederich Albert Bruijning (born Paramaribo, 10 November 1919) studied biology at Leiden University, obtaining his doctor's degree in 1948. After having been a biology teacher in a secondary school at Haarlem, Holland, he was appointed 1 October 1949 government biologist of the Medical Service in Suriname, where he stayed until 1955, when he accepted a position as curator of Entomology at the Leiden Museum. 1 January 1959 he was appointed curator at the Institute of Tropical Hygiene in Leiden. During his stay in Suriname Dr. Bruijning made several trips into the interior of the country, he took part in the 1952 Medical Expedition to the border region, and collected material near Paramaribo. This material is now incorporated in the Leiden Museum.

J. H. C. B. Heyde (born Paramaribo, 5 May 1921) in 1949 was appointed assistant of the Information Service of the Department of Agriculture of Suriname, and 1 July 1950 became chief assistant of the Entomology department of the Agricultural Experiment Station of Suriname, a position which he occupied till 1 March 1953. In this function Heyde made collections, among other things of Crustacea from the Suriname River, which were sent for identification to the Leiden Museum. At present Heyde is occupied with the export of living animals.

Hendrikus Wilhelmus Lijding (born Den Helder, 31 December 1903), after finishing the school of navigation served from 1923 to 1937 as a chief mate in the Dutch merchant navy. From 1932 to 1934 and from 1937 to 1941 Lijding was the head of a fisheries company in the Netherlands East Indies. After the Japanese capitulation he became attached to the Fishery Service of East Indonesia, which he left in 1951. After having occupied himself in 1951 and 1952 with fishery problems in Netherlands New Guinea, on 1 January 1953 he was appointed Adviser for Fishery Affairs in Suriname and on 1 January 1955 became the Head of the Suriname Fisheries Service. Mr. Lijding, being much interested in the Suriname prawn fishery, repeatedly collected samples, which were sent for identification to the Leiden Museum; also other Decapods were collected by him.

Pieter Wagenaar Hummelinck (born Vlaardingen, 13 January 1907) studied biology at Utrecht University, obtaining there his doctor's degree on 8 July 1940. 1 January 1942 he became assistant at the section Parasitology of the Veterinary Faculty of Utrecht University. Since 1 January 1946 Hummelinck is curator at the Zoological Laboratory of Utrecht University. As a member of the board of WOSUNA (Foundation for scientific research of Suriname and the Netherlands Antilles) and as secretary of the "Natuur-

wetenschappelijke Studiekring voor Suriname en de Nederlandse Antillen" (Society for the study of the natural history of Suriname and the Netherlands Antilles), Hummelinck is the central figure for all matter concerning the study of zoology of the Netherlands Antilles. He made four collecting trips to the West Indies (April-December 1930; May 1936-April 1937; July 1948-September 1949; December 1954-September 1955). He visited Suriname during the last three of these trips: 2 and 3 May 1936 (collecting near Paramaribo, cf. Hummelinck, 1940, p. 20), 2 and 3 August 1948 (collecting near Paramaribo and Zanderij, cf. Hummelinck, 1953, pp. 20, 49), and 1-3 September 1955 (collecting near Republiek and Kabel).

Johannes van der Kamp (born Bussum, 4 July 1936) is a preparator and photographer of the Zoological Museum at Amsterdam. As part of his military service Van der Kamp stayed as a soldier in Suriname (February 1956 to March 1957), while in his spare time he collected mammals, amphibians, reptiles, fishes, and shrimps. Most of this material was obtained near Zanderij, a small part being collected near Paramaribo; it is now preserved in the Amsterdam Museum.

Lipke Bijdeley Holthuis (born Probolinggo, East Java, 21 April 1921) studied biology at Leiden University, obtaining his doctor's degree on 23 January 1946. 1 August 1942 he was appointed assistant curator at the Rijksmuseum van Natuurlijke Historie at Leiden, he became a curator on 1 August 1947. As an extension of a half year's trip to the Netherlands Antilles he visited Suriname from 29 March to 13 April 1957 and made collections in and near Paramaribo, in various localities between Paramaribo and Kabel, in Coronie, in localities between Paramaribo and the mouth of the Coppename River, at the mouth of the Suriname River, and in the district Commewijne near the Fisheries Service Station "Matappica".

Anton Cornelis Jacobus Burgers (born Arnhem, 21 August 1925) studied biology at Utrecht University, obtaining his doctor's degree on 9 July 1956. Dr. Burgers, who is attached to the staff of the department of endocrinology of the Zoological Laboratory of Utrecht University, in 1956 and 1957 visited the Netherlands Antilles and Suriname with the main object of studying the eyestalk hormones of Crustacea (especially of the genus *Uca*). Part of the material used for these experiments was preserved and sent for identification to the Leiden Museum, where it now forms part of the collections. Suriname was visited by Dr. Burgers from 7 August to 4 September 1957; during this period crabs were collected at the mouth of the Matappica Canal (15-30 August 1957) and near Christiaankondre at the mouth of the Marowijne River (the end of August 1957).

V. Expeditions. In the present century several expeditions were sent out

to the interior of Suriname with the object to increase our knowledge of the geography, the population, the geology, and the natural history of that region. Though in most of these expeditions the collecting of natural history objects was considered to be of secondary importance, we owe a great deal of information on the animal and plant life of the interior to these exploration trips.

1900 Nickerie Expedition. Personnel: Dr. H. van Capelle, lecturer of the State Agricultural School, Wageningen, Netherlands (leader; zoology, geology, tree flora), Dr. J. E. Tulleken, pharmacist (botany), H. van Capelle, Jr. (meteorology, photography), Mr. C. van Drimmelen, commissioner of the Nickerie District, Mr. J. Haenen (geography), Mr. J. C. Ganzert (geography). The expedition started from Nieuw-Nickerie and went up the Nickerie River by boat to somewhat above the Van Eeden Falls, at about  $4^{\circ} 42' N$  (3-24 September 1900). Then it returned, following the Nickerie down to the mouth of the Fallawatra River (25 September-2 October), which was explored first by boat and then overland along a tracé which ran more or less parallel to the river, crossed it several times, and ended at about  $4^{\circ} 45' N$  (2-18 October). When returning, the mouth of the Fallawatra River was reached on 22 October and Nieuw Nickerie on 2 November. Narratives: Van Capelle, 1903, 1905.

1901 Coppename Expedition. Personnel: Major L. A. Bakhuis, former officer of the Topographic Service of the Netherlands East Indies (leader; geography), lieut. A. J. van Stockum (geography), the medical officer H. A. Boon (physician; zoology, botany), Mr. W. L. Loth, government land surveyor (geography). The expedition left Paramaribo by boat 5 August 1901, arriving at the mouth of the Coppename River 6 August. This river was followed up by boat to the confluence of the Linker and Rechter Coppename Rivers (6 August-19 September); on the way up longer stops were made at the Raleigh Falls (12-28 August), the Langadansoela Falls (31 August-7 September), the Sidonkroetoe Falls (8-13 September), and the Tonckens Falls (14-19 September). Thereupon the Linker Coppename River was followed up to about  $4^{\circ} 10' N$  (19 September-3 October). Here the larger part of the company returned, only Van Stockum went on to about  $4^{\circ} N$  (3-7 October). The main body of the expedition reached the confluence of the Linker and Rechter Coppename Rivers on 4 October. Mr. Boon then went to the Tonckens Falls camp (4-17 October), Bakhuis and Loth explored the Rechter Coppename to about  $4^{\circ} N$  (4-9 October), returning along the same way to the Tonckens Falls (9-11 October), where Van Stockum had arrived 9 October. The latter stayed here till 13 November. The main party went home down the Coppename River (17 October-1 November), from

21 to 24 October staying near the Raleigh Falls and exploring the Tanjimama River. This group returned in Paramaribo on 3 November, Mr. van Stockum arriving there on 28 November. Narrative: Bakhuis, 1902.

1902-1903 Saramacca Expedition. Personnel: Lieut. A. J. van Stockum (leader; geography, geology), Mr. P. J. de Kock, medical officer of the Netherlands Navy (physician; zoology), Dr. A. Pulle, assistant of the Botanical Department, Utrecht University (botany), Mr. J. W. van Gelder. The expedition left Paramaribo by boat on 31 October 1902, reaching the Saramacca River the next day via the Saramacca Canal. It went up the Saramacca River to Post Mindreneti (1-5 November). Mr. van Stockum with a small party continued the trip up the Saramacca and Toekoemoetoe Rivers to about  $4^{\circ} 5' N$  (8 November-14 January), returning to the mouth of the Ietie Creek at about  $4^{\circ} 8' N$  (14-15 January 1903); on the way up they stayed slightly over one month near Jan Basi Gado Mt. (23 November-1 January). From 15 January to 3 February this group went overland to the Hendrik Mt. and returned along the same way (3-25 February), arriving 26 February at the confluence of the Saramacca and Toekoemoetoe Rivers. The other party, including both the zoologist and the botanist, stayed longer at Post Mindreneti and arrived 16 December at the camp near Jan Basi Gado Mt. They left this camp after 1st January, arriving at the mouth of the Toekoemoetoe River before Mr. van Stockum returned there. From this camp the expedition went up the Saramacca River to near De Kock Mt. at about  $3^{\circ} 47' N$  (5-17 March), and stayed there till 24 March when the return trip down the Saramacca was undertaken. Dr. Pulle went on directly to Paramaribo, the rest of the party stayed some time (30 March-20 April) at about  $4^{\circ} 20' N$  near Mombabasoe, undertaking from there an overland trip to Ebba Mt. The return trip began on 21 April and Paramaribo was reached on 27 April. Narratives: Van Stockum, 1904, 1905.

1903-1904 Gonini Expedition. Personnel: Lieut. A. Franssen Herderschee, officer of the topographical service of the Netherlands East Indian Army (leader; geography), Lieut. C. H. de Goeje (geography), Mr. G. M. Versteeg (physician; botany, zoology), Mr. H. van Breen, district commissioner, Mr. B. von Faber, mining engineer (geology). The expedition left Paramaribo on 28 July 1903 by boat, arriving the next day at the mouth of the Marowijne River, and reaching the mouth of the Gonini River on 10 August. Here, on 13 August, the expedition was split into two parties. One, led by De Goeje, went down the Lawa River and then up the Tapanahoni River to near the Manlobbi Range, which then was climbed for surveying purposes. On 24 August the leader left the second party and joined the first the next day; on 5 September the first party left the Tapanahoni River and on 8 September

met the second party, which had gone up the Gonini River to the Gransoela Falls. The zoologist had stayed most of the time with the second party, leaving it only around 4 September to meet the first group. The complete expedition went up the Gonini to the confluence of the Wilhelmina and Emma Rivers (9-12 September). Here again two parties were formed. One, with the leader and Van Breen, went up the Emma River to about  $3^{\circ} 25' N$  (16-26 September), returning at the mouth of the river on 1 October. The second party (with De Goeje and Versteeg) went up the Wilhelmina River to about  $3^{\circ} 28' N$  (16-24 September) and then returned (25 September-3 October). The zoologist became ill and stayed behind on 21 September, being picked up by his party on their return trip. The main body of the expedition stayed at the confluence camp till 11 October, only a small party under De Goeje left 5 October for Cottica on the Lawa River. The others went down to the Gransoela Falls (11 and 12 October) and stayed there till 16 October. Thereupon they went to Cottica (16-24 October) and stayed there till 10 November; in this period overland trips to the Cottica Range in French Guiana were made. On 10 November the expedition went up the Lawa River to the mouth of the Litani River (10-20 November); Van Breen left the expedition on 13 November to return via Albina (1 December) to Paramaribo. The rest followed the Litani River to close to the Brazilian border (20-30 November). Here the region of Knopaiamoi Mt. was explored (30 November-15 December). The return trip went down the Litani (16-24 December), the Lawa (25 December-2 January), and Marowijne Rivers. Via Albina (6 January 1904) Paramaribo was reached on 8 January. Mr. von Faber's trip coincided only occasionally with that of the main part of the expedition; he left Paramaribo much later, concentrated on the Gonini and Emma Rivers (August-November) and returned to Paramaribo with Van Breen. Narrative: A. Franssen Herderschee, 1905.

1910-1911 Corantijn Expedition. Personnel: Lieut. J. G. W. J. Eilerts de Haan (leader till his death on 29 August 1910; geography), Lieut. C. C. Käyser (leader after the death of Eilerts de Haan; geography), Mr. J. F. Hulk, medical officer of the Netherlands Navy (physician; botany, zoology). The expedition left Paramaribo on 19 July 1910 by train for Kabel, from where, on 23 July, it went up the Suriname River by boat, reaching Goddo at the confluence of the Gran Rio and Pikien Rio on 2 August. The Gran Rio was then followed up to about  $3^{\circ} 26' N$  (6-24 August). From here an overland trip of about 24 km was made to the upper reaches of the Lucie River. Several circumstances, e.g., the death of the leader, caused that the trip down the Lucie River did not start until 12 October. Most of the zoological collections were made in the period 24 August-12 October. The Lucie

River was followed down (12 and 13 October) and from the point then reached, at about  $56^{\circ} 30' W$ , several overland and river trips were made to explore some mountains on the right bank (13 to 21 October). On 23 October a point on the Lucie River at about  $56^{\circ} 40' W$  was reached. The mountains on the left bank were explored here (23 October-14 November). On 18 November a camp was made at about 30 km from the mouth of the Lucie River at about  $57^{\circ} 24' W$  (18 November-7 December), and from 9 to 18 December the expedition stayed at a camp still closer to the mouth of the river. The Corantijn River was reached on 19 December and followed up to the mouth of the Sipaliwini River (21 December-9 January); the expedition then went up this river as far as about  $56^{\circ} 16' W$  (9-18 January). Now an overland trip of about 40 km was undertaken in a N.E. direction (18 January-3 February). Returning on 7 February, the Sipaliwini was reached on 9 February, and the mouth of the Lucie River on 22 February. From here the expedition went down the Corantijn River to the mouth of the Kabalebo River (25 February-15 March), which was followed up to about  $57^{\circ} 10' W$  (15-23 March). The Corantijn was reached again on 29 March and followed to the mouth, the expedition entering Nieuw-Nickerie on 1 April 1911. Narratives: Käyser, 1912; Hulk, 1911.

1922 Expedition to Hendrik Mt. Personnel: Dr. G. Stahel, director of the Agricultural Experiment Station at Paramaribo (leader), Mr. J. W. Gonggrijp, government forest service officer. The expedition left Paramaribo on 10 February 1922, going up the Saramacca River to explore Hendrik Mt. (1080 m alt.) in the Emma Range. The main interest of the expedition was botanical, but a number of zoological specimens were collected.

1926 Expedition to the Wilhelmina Range. Personnel: Dr. G. Stahel, director of the Agricultural Experiment Station at Paramaribo (leader; botany, meteorology), Dr. R. IJzerman (geology), Dr. D. S. Fernandes, phytopathologist of the Suriname Agriculture Department (zoology), Mr. H. C. van Ommeren (physician), Col. J. Kremer (geography), Mr. H. Kuiperbak (geography), Mr. G. W. M. Ahlbrinck (ethnology). From the beginning the expedition was split into two parties. On 5 January 1926 the first party with Drs. Stahel, IJzerman and Mr. van Ommeren went by train to Kabel and from there by boat up the Suriname River, reaching Goddo near the confluence of the Gran Rio and Pikien Rio on 16 January. The Gran Rio then was followed to about  $3^{\circ} 24' N$  (IJzerman: 30 January-10 February; Stahel and Van Ommeren: 8-28 February). From here the expedition went overland to the Lucie River (IJzerman: 10 February- 8 April; Stahel and Van Ommeren: 28 February-19 April). The Lucie River was followed down to about  $56^{\circ} 30' W$  (IJzerman: 8-10 April; Stahel and Van

Ommeren: 19-22 April). Several trips, mostly overland, but partly by boat, were made to explore the Wilhelmina Range and the Tafel Mt. (10 and 22 April to 9 August). Afterwards the Lucie River was followed down to its mouth (9-18 August). The Corantijn and New Rivers were then explored up to  $3^{\circ} 7' N$  (22 August-4 September). Thereupon the party went up the Coeroeni River and back to the New River (4-10 September). On 19 September Mr. van Ommeren left the expedition to return to Paramaribo, the others went again up the Coeroeni and Koetari Rivers to somewhat N. of  $2^{\circ} N$  (19 September-18 October), returning at the mouth of the Lucie River on 5 November. From here the Corantijn River was followed to its mouth (6-20 November) and Paramaribo was reached on 24 November. The second party with Col. Kremer and Dr. Fernandes started from the mouth of the Corantijn River, leaving Nieuw-Nickerie on 20 April 1926 and arriving at the mouth of the Lucie River on 7 June. A camp was made on the shore of the Lucie River at about  $57^{\circ} 25' W$  (2-9 July). On 10 July col. Kremer went up the Lucie River and joined the main party; he explored the Wilhelmina Range from 27 July to 2 September, and on 6 September, after an overland crossing from the Lucie to the Coeroeni River, joined the main party at the latter river. On 19 September Kremer and Van Ommeren left the rest of the expedition, and arrived on 6 October in Nieuw-Nickerie. On 11 July Dr. Fernandes left the camp at the Lucie River at  $57^{\circ} 25' W$  and went overland in a N.E. direction for about 43.5 km (11 July-8 August). He returned at the Lucie River on 16 August. Going down the Lucie River he joined the main body of the expedition on the same day. On 28 August he left the expedition, arriving on 11 September in Nieuw-Nickerie. The ethnologist, Ahlbrinck, left Nieuw-Nickerie on 10 August 1926, joining the main body of the expedition at the mouth of the New River on 16 September. He took part in the trip up the Coeroeni and Koetari Rivers, leaving the rest of the party on 21 October to explore the Aramatau River (25 October-8 November). On his return trip the Kamani River was explored (17-19 November), and longer stops were made at the Frederik Willem IV Falls (1-8 December) and the Wonotobo Falls (16-22 December). Nieuw-Nickerie was reached by Ahlbrinck on 29 December. Narratives: Stahel, 1926-1927; Ahlbrinck, 1929.

1948-1949 Suriname Expedition. Personnel: Dr. D. C. Geijskes, entomologist of the Agricultural Experiment Station, Paramaribo (leader; zoology), Mr. P. H. Creutzberg (zoology), Dr. J. Lanjouw, professor of botany, Utrecht University (botany), Mr. J. C. Lindeman (botany), Dr. J. P. Bakker, professor of physical geography, Amsterdam University (geomorphology, geology), Dr. A. Brouwer, curator, Geological Museum, Leiden

(geology). The expedition explored four tracé's in the coastal region and in the anterior foothills:

1. From the middle of September to the end of October the expedition went due north from Moengotapoe (N.E. Suriname) till further progress was made impossible by the large Third Swamp. Then they started from the other end of the intended tracé, namely from the sea shore near the Wiawia Bank due south till the Third Swamp was again reached (10 November to the beginning of December 1948).

2. At 21.6 km E. of Coronie a north-south tracé, extending from the sea shore 5.5 km southward, was explored. This tracé crossed the highway from Coronie to Paramaribo at about 3 km from the sea (9-23 December 1948).

3. The savanne region near the Tibiti River, a right hand branch of the Coppename River, was explored from 3 to 20 January 1949.

4. A tracé with a length of about 20 km was made, extending due west from a point on the Marowijne River at  $4^{\circ} 47' N$ . This tracé penetrated into the Nassau Range at about 100 km S. of Albina (3 February-1 April 1949).

Furthermore material was collected by the expedition in the beginning of September near Republiek, and in the middle of September and in October in the mouth of the Marowijne River (when it went to and came from Moengotapoe). In January 1949 collections were made in the Suriname River near "Peperpot" plantation by Mr. Creutzberg, who on account of illness could not attend the third project of the expedition. The actual expedition over, some material was collected near Paramaribo. Narrative: Bakker and Lanjouw, 1949.

1952 Medical Expedition to the southern border region. Personnel: Dr. D. C. Geijskes (leader; zoology), Dr. C. F. A. Bruijning (zoology), Dr. V. de Munck (geology), Mr. J. W. Brinck (geology), Mr. J. D. G. Schaad (physician), Mr. M. G. Malmberg (physician). On 11 February 1952 the expedition started from Paramaribo for Albina, where a couple of days were spent, leaving on 17 February. The Marowijne and Tapanahoni Rivers were followed up by boat and on 1 March Drietabbetje on the Tapanahoni River was reached. The expedition stayed here till 7 March, when it went up the Tapanahoni River, reaching the mouth of the Paloemeu River on 19 March. This river was then followed up almost to its source, the end camp near the village of Apisiké on the upper Paru River in Brazilian territory being made on 7 April. From this camp a trip on foot was made farther into Brazil (10-17 April). A camp was then made on the upper West Paru River, Brazil (23 April), and on 25 April Alinsoekondre was reached. From here Geijskes and De Munck went to the upper Sipaliwini River (Corantijn

basin) (28 April), while Brinck explored the Paru savannah (30 April). Between 8 and 10 May the members of the expedition met again in a camp on the upper Tapanahoni River (Tapanahoni). From here the expedition went down the Tapanahoni River (12 May), reaching Drietabbetje on 5 June; at several villages on the way down some days were spent. On 8 June Geijskes left Drietabbetje for Albina and Paramaribo, while Bruijning arrived much later (27 June) in Albina.

1957 "Coquette" Investigations. The American trawler "Coquette" (owner Mr. Henry B. Lee of Miami, Florida) was hired by the government of Suriname to explore the sea off the Suriname coast. The main object of these investigations was to ascertain whether this area provides enough shrimp and fish to make an offshore fishery economically possible. Apart from noting the amount of shrimp taken at each haul, samples of fish and marine invertebrates were collected for purposes of scientific research. On the first six voyages (1-5 April, 8-12 April, 15-20 April, 23-27 April, 29 April-3 May, and 6-9 May, respectively) this collecting was done by Mr. H. W. Lijding, Dr. D. C. Geijskes, or employees of the Suriname Fisheries Service; the localities, though quite accurately given, were not indicated in degrees latitude and longitude. On the 7th and later trips the collecting of scientific material was done by Mr. James B. Higman of the U.S. Fish & Wildlife Service, who for this purpose had come over from the U.S.A. From this moment the localities were given station numbers and of each the exact position was noted. These stations range from 1 (11 May 1957) to 453 (31 July 1957); later, in August, a few more samples were taken by the "Coquette". The area investigated by the "Coquette" extends from the mouth of the Nickerie River eastward to about Ile de Salut in French Guiana. Practically all the samples were taken between 20 and 30 miles offshore. The material collected by the "Coquette" has been divided among the Leiden and Washington Museums. After the completion of the above project the Suriname government took over the "Coquette", which is now used by the Suriname Fisheries Service.

### C. OCCURRENCE OF DECAPODA IN SURINAME

Suriname may roughly be divided into three regions each of which possessing a more or less homogeneous Decapod fauna:

a. The interior region, which extends from the Suriname-Brazil border northward to the foothills of the Suriname mountains; the northern limit of this region is indicated by the line connecting the northernmost falls of the larger rivers. The interior region contains numerous larger or smaller streams, the larger flow roughly from south to north. In the area under

consideration the water of the rivers is not subject to the influence of the tides, it is clear and perfectly fresh. In most instances the river bottom is rocky, while there are numerous rapids and falls (pl. I fig. 1). The Decapoda found in this region are (1) typical freshwater prawns belonging to the genus *Macrobrachium*, and (2) freshwater crabs of the family Potamonidae. Three species of *Macrobrachium* have thus far been found in the interior region: *M. brasiliense*, *M. olfersii*, and *M. carcinus*. *M. carcinus*, and in rare instances also *M. brasiliense*, are also found in the coastal region. Of the Potamonids *Potamocarcinus latifrons* is a characteristic species of the interior region: its known range, namely, coincides exactly with the interior region as defined above. The three species of *Pseudothelphusa* known from Suriname are either restricted to the interior region or extend their areas slightly into the extreme southern part of the coastal region. The three species of *Trichodactylus* inhabit the interior as well as the coastal regions, apparently being more abundant in the latter. Some of the freshwater crabs sometimes are found out of the water in humid habitats.

b. The coastal region, which extends from the northern foothills to the sea shore. It contains the lower reaches of the rivers (below the last falls). In the large rivers the influence of the tides remains noticeable at a considerable distance from the sea. In the estuaries the water is muddy and brackish (pl. 1 fig. 2). The salinity of the various waters not only depends on their distance from the sea, but also on the tide, and on the season. In the wet season, namely, more water is carried down by the rivers so that the sea water is pushed farther out, while furthermore the waters are directly freshened by the fallen rain. In the savannah area in the southern part of the coastal region the water of small streams is fresh, but often more or less acid; here the bottom is usually sandy, often covered by a thick layer of dead leaves. In the mouths of the large rivers an estuarine fauna is found consisting of marine prawns which pass in and out with each tide. The most common of these prawns are *Xiphopenaeus kroyeri* and *Palaemon schmitti*, while also *Acetes americanus*, *Penaeus aztecus*, *P. schmitti*, and *Hippolysmata oplophoroides* form part of this fauna. The actual sea shore is very poor in Decapoda, since its larger part consists of mud or tough clay with here and there a sandy spot; there are no rocks, while the coastal shelf is also muddy. The sandy areas of the sea shore make it possible for the sand-burrowing crab *Ocyropode quadrata* to live here. On the beaches the hermit crab *Clibanarius vittatus* is rather common, while several crabs like *Pachygrapsus gracilis*, *Sesarma ricordi*, and *Panopeus herbstii* are also found here. The soft muddy shores of the mouths of the rivers, and the mangrove vegetation along the sea coast and the river banks are the home

of many amphibious or land crabs like *Goniopsis cruentata*, *Pachygrapsus gracilis*, *Aratus pisonii*, the four species of *Sesarma*, the six species of *Uca*, and *Ucides cordatus*, while also the shrimps *Alpheus heterochaelis* and *Merguia rhizophorae* are to be found here. The edible swimming crab *Callinectes bocourti* is quite common in stagnant brackish waters. A number of prawns is found farther to the interior: *Macrobrachium carcinus* and *M. amazonicum* are usually found in the larger rivers, sometimes in parts that are brackish, while *Acetes paraguayensis*, *Palaemonetes carteri*, and *Macrobrachium jelskii* generally occur in smaller, usually fresh or slightly brackish waters, either stagnant or flowing (pl. II fig. 1). *Palaemonetes carteri* extends its range to close near the foothills, being sometimes found in acid savannah creeks. A typical inhabitant of the shaded acid savannah creeks is the peculiar shrimp *Euryrhynchus wrzesniowskii*.

d. The sea off the Suriname coast. The fauna of the inshore waters proves to be very poor in species, but as is demonstrated by the collections made by the trawler "Coquette", a great number of Decapoda occur at a distance of about 20 to 30 miles offshore. These species form more than half of the total number of Suriname species dealt with in the present paper.

#### D. ECONOMIC IMPORTANCE OF SURINAME DECAPODA

The economically most important Decapod in Suriname, at least as far as local consumption is concerned, is the prawn *Xiphopenaeus kroyeri*, which is caught in enormous numbers in the estuaries of all the large rivers and sold at the various markets either dried, fresh, or frozen. Until about the end of 1957 *Xiphopenaeus* was also exported in fairly great quantities. The dried prawns were mainly shipped to Trinidad, the frozen product to the U.S.A. A large modern shrimp factory was built in Paramaribo in 1956. Here the *Xiphopenaeus* prawns were cooked, peeled, frozen, and packed. The shrimps for this factory were bought from local fishermen. When, as a result of the investigations by the "Coquette", it became clear that considerable quantities of prawns belonging to the genus *Penaeus* (*P. brasiliensis*, *P. aztecus*, and *P. schmitti*) do occur off the Suriname coast, a fishery on these animals was started. At present two American fishing vessels operate off Suriname, selling their catches to the above mentioned shrimp factory in Paramaribo, which is the property of the S.A.I.L. (Suriname-American Industries Ltd.). This factory has now almost entirely changed over from *Xiphopenaeus* to the larger *Penaeus*, which, like *Xiphopenaeus* before, is now exported frozen to the U.S.A. It is to be expected that four more fishing vessels will join the two that are now in operation.

The species of Suriname Decapoda which for local consumption ranks

second in importance is the prawn *Palaemon schmitti*, which occurs together with *Xiphopenaeus* in the river mouths. It is sold either fresh or dried. The dried product is exported on a small scale. Other estuarine prawns, like *Penaeus aztecus*, *P. schmitti*, *Hippolyasmata oplophoroides*, and *Acetes americanus* are sold locally with *Xiphopenaeus kroyeri* and *Palaemon schmitti*, but are caught in too small a quantity to be of much economic importance. The fresh water prawn *Macrobrachium carcinus*, and perhaps also *M. amazonicum*, is caught and eaten in Suriname, but is too scarce to be of much value as a food product.

Among the crabs both *Ucides cordatus* and *Callinectes bocourti* are much eaten and are offered alive for sale on the markets; also *Ocypode quadrata* seems to be used as food. Of all crabs it is *Ucides* which seems to be most important from an economic point of view, but, like the other species, it is only used locally and is not exported. Fresh water crabs are eaten, but are not highly valued.

No Suriname Crustacea have thus far been reported as being actually harmful to man. In the Coronie Polder innumerable fiddler crabs belonging to three species (*Uca rapax*, *U. mordax*, and *U. vocator*) make their holes in the banks of the ditches inside the dike of the polder (pl. II fig. 2); the fear was expressed that these myriads of burrows might be harmful to the solidity of the dike. There seems to be little chance, however, that this is true, since the burrows are more or less vertical and thus do not undermine the dike, as for instance do the burrows of the mitten crab (*Eriocheir sinensis* H. Milne Edwards), which at one time formed a danger to the dikes in the Netherlands. Reports that some crabs are poisonous (cf. *Uca maracoani*) have so far not been substantiated.

#### E. ENEMIES OF SURINAME DECAPODA

The most important enemy of the crabs and shrimps of Suriname of course is man (see chapter D), but there are also many other animal predators of Suriname Crustacea.

Of three Suriname mammals it has been claimed that they feed mainly on crabs, and for this reason specific names like *cancrivorus* or *carcinophagus* have been given to them at one time or another. The crab-eating habit has been proven without doubt for the Kraboe-dagoe (= Crab dog), *Procyon cancrivorus* (Cuvier, 1798), a raccoon, which inhabits the coastal area of Suriname and feeds on crabs, birds, lizards, frogs, insects, and fruit. On the sandy sea shore near the mouth of the Matappica Canal, I saw several holes of *Ocypode quadrata* showing traces of the work of a crab-dog, which had tried to dig the crabs out of their burrows. Sanderson (1949, p. 771)

described the way in which *Procyon* treated crabs as follows: "These animals are omnivorous, but as the popular name implies, are fond of crabs. The animals crouch on the hind legs and gently pat or "tread" the live crabs with the fore-feet until they are battered and partly insensible. They are then seized with the mouth. Even small crabs are dealt with in this manner. The whole crab is crunched up and swallowed and the sharp-edged, angular shell fragments pack the exceedingly thin transparent intestine in such a manner that it is hard to explain why they fail to perforate its walls". This account checks well with Durrell's (1958, p. 157) observations made in British Guiana: "I caught some river crabs and put them in with the raccoon . . . When he saw the crabs he surveyed them with a slightly worried expression, and then, choosing a large one, he squatted down in front of it and began to pat and stroke it swiftly and gently, occasionally stopping and shaking his paws. The crab made wild lunges with its pincers, but the raccoon's paws were too swift to be caught; then it retreated, but the raccoon followed it, still patting. After ten minutes of this the crab, though quite undamaged, was exhausted and had given up trying to defend itself with its pincers. This was the moment the raccoon had been waiting for: he leant forward suddenly and bit the unfortunate crab in half. Then he sat back and mournfully watched its death throes; when it had stopped twitching he picked it up daintily between the tips of his toes and popped it into his mouth, scrunching and swallowing with a look of acute melancholy on his face". Schomburgk (1848, p. 443) gave a different version: "So wie er eine Krabbe gefangen, beisst er ihr zuvörderst die Scheeren ab, um die Beute ruhig verzehren zu können".

The crab eating habits of the other two mammals need confirmation. The species name of the common Suriname Opossum, *Didelphis marsupialis* (L., 1758) has as its synonyms *Didelphis karkinophaga* Zimmermann, 1780, *D. carcinophaga* Boddaert, 1784, and *D. cancrivora* Gmelin, 1788, all of which are based on Buffon's (1776, p. 272, pl. 54) "Le Crabier". Buffon's animal came from French Guiana and was said by its author to feed mainly on crabs: "les crabes font sa principale nourriture, & lui profitent, car il est toujours gras. Quand il ne peut pas tirer les crabes de leur trou avec sa patte, il y introduit sa queue, dont il se sert comme d'un crochet; le crabe qui lui serre quelquefois la queue le fait crier . . ." (p. 274). Also on Buffon's plate the animal is figured with some crabs. Buffon's story is based entirely on second-hand information, which at least partly (viz., the part pertaining to the way in which the opossum catches the crabs with its tail) seems to rest on pure imagination. The most recent information that I could find concerning the feeding habits of the Suriname opossum is that given by

Cabrera & Yepes (1940, pp. 22, 23), who name the species "Mbicuré cangrejero" explaining that "el apelativo cangrejero con que aquí lo distinguimos es la traducción del nombre *crabier* que suelen darle los franceses de la Guayana, y le conviene perfectamente por constituir los cangrejos de agua dulce, según parece, su alimento predilecto". They further note that the animals feed on small mammals, birds, insects, crustaceans, and fruit, while those that live near the sea shore also are fond of marine crabs. Buffon's story about the capture of crabs by the opossum by means of its tail is considered "una linda fábula".

The third Suriname mammal which has been said to eat preferably crabs is the South American fox, *Dusicyon thous* (L., 1766), which has among its synonyms the name *Viverra cancrivora* Brongniart, 1792. According to Cabrera & Yepes (1940, p. 130), however, observations by modern zoologists do not confirm the assertion of older authors that the species prefers crabs to all other food. The diet of this fox seems to consist mainly of small mammals and birds, insects (grasshoppers and beetles), and fruit. It also eats small turtles, and therefore, according to Cabrera & Yepes, it would not be surprising if it occasionally also does eat crabs, but these certainly do not form its main food.

Among the Suriname birds there are many species that feed on Crustacea. Several of the Ardeidae like *Florida caerulea* (L.), *Nyctanassa violacea cayennensis* (Gmelin) and *Butorides striatus* (L.) are known to eat crabs, while *Cochlearius cochlearius* (L.), the "Krabbeneter" (= crab eater), belonging to the family Cochleariidae, even derived its Dutch name from that habit. Some of the birds of prey as *Heterospizias meridionalis* (Latham) and *Buteo albicaudatus colonus* Berlepsch have been reported to occasionally eat crabs, but the two best known crab eaters among the Suriname birds are the Kraboe-akka (= crab falcon), *Buteogallus aequinoctialis* (Gmelin), and the Kraboe-owroekoekoe (= crab owl), *Pulsatrix perspicillata* (Latham). According to the brothers Penard (1908, p. 401), who indicate the species as *Busarellus nigricollis*, the Kraboe-akka is mostly found along the creeks and rivers, and especially in the mangrove forests along the coast. "Daar zitten ze meestal onbeweeglijk, loerende naar prooi, die grootendeels uit krabben, *Gecarcinus ruricola*, bestaat, hoewel ook kruipende dieren, visschen, garnalen, insecten, enz. niet versmaad worden" (there they are usually motionless perched, spying for prey, which largely consists of crabs, though reptiles, fish, shrimp, insects, etc. are not refused either). The name *Gecarcinus ruricola* used by the Penard brothers evidently is incorrect, it is clear that *Ucides cordatus* is meant. As to the food of the crab owl the Penard brothers remarked (1908, p. 457): "Hun prooi bestaat, gelijk de naam aan-

duidt, vooral uit krabben, hoewel ook reptielen en kleine zoogdieren niet versmaad worden" (their prey consists, as indicated by their name, mainly of crabs, though reptiles and small mammals are not refused either). As shown by the specimen of *Penaeus aztecus* found in the stomach of *Chloroceryle americana* (Gmel.) (see p. 64), enemies of Crustacea are also found among the kingfishers. The list of Suriname birds feeding on Decapoda probably is a long one, but the feeding habits of a large number of species are as yet very poorly known.

Also Suriname reptiles are known to eat Crustacea: Geijskes found a specimen of *Macrobrachium carcinus* in the stomach of a snake.

It is self-evident that a very great number of species of fish have to be ranged among the enemies of Suriname Decapoda, though little positive information on this subject is thus far available. As shown below two specimens of *Pseudothelphusa denticulata* have been found in the stomach of an electric eel, *Electrophorus electricus* (L.). Furthermore, Dr. Geijskes informed me that, when examining the stomach contents of fishes caught in the Nickerie district, he found that almost all specimens proved to have eaten either prawns or small crabs or both: *Selenaspis passany* (Cuv. & Val.) (prawns and small crabs), *Selenaspis herzbergi* (Bloch) (prawns and crabs), *Elops saurus* L. (prawns), *Centropomus undecimalis* (Bloch) (prawns and small crabs).

Also among the invertebrates several species feed on Decapoda. The only positive record in this connection as far as Suriname material is concerned, is that of an octopus having partly swallowed a specimen of *Trachypenaeus constrictus* (Stimpson).

## F. VERNACULAR NAMES

The vernacular names of Suriname Decapoda are far more numerous than appears from the present paper. The names given here are only those indicated on the labels of the specimens examined, those which I obtained with the help of Dr. Geijskes and Mr. Lijding during my visit to Suriname, and those mentioned in the literature.

Most of the names given here are in the Suriname language or "takki-takki", which originally is a kind of negro-english containing Dutch and Portuguese components; it is spoken throughout the coastal area. Furthermore some names are taken from various Indian languages, the most important of which are the Arowac and Carib. Some of the species have Dutch names, but these generally are mere translations of Suriname names. The Dutch speaking part of the Suriname population generally indicates the various species with their Suriname appellations.

The vernacular names given in the present paper are the following:

Suriname language:

bigi sara-sara (= big prawn)	<i>Xiphopenaeus kroyeri</i>
didibrie krabu (= devil's crab)	<i>Goniopsis cruentata</i>
kábu	<i>Trichodactylus spinifer</i>
kaka (= cock)	<i>Hippolysmata oplophoroides</i>
krabu	general term for crab
lontubaka	<i>Pseudothelphusa</i> spec. (?wymani)
odi odi botoman (= bye, bye, man in the boat)	<i>Uca</i> spec.
redi sara-sara (= red prawn)	<i>Xiphopenaeus kroyeri</i>
srika (or sirika)	<i>Callinectes bocourti</i>
stone sara-sara (= rock prawn)	<i>Macrobrachium carcinus</i>
tranga bakka (= strong back)	<i>Hippolysmata oplophoroides</i>
witti bere (= white belly)	<i>Palaemon schmitti</i>

Arowac language:

haralubata	<i>Callinectes bocourti</i>
kwa	<i>Ucides cordatus</i> (male)

Carib language:

kusa	<i>Ucides cordatus</i> (male)
waiamu	<i>Ucides cordatus</i> (female)

Oajana language:

waimoh	<i>Trichodactylus serratus</i>
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Dutch:

duivelskrab (= devil's crab)	<i>Goniopsis cruentata</i> , possibly also <i>Sesarma rectum</i> and <i>Uca mara-</i> <i>coani</i>
garnaal	general term for prawns and shrimps
krab	general term for crabs
kreekkrab (= creek crab)	<i>Pseudothelphusa</i> spp.
landkrab (= land crab)	<i>Ucides cordatus</i>
rivierkrab (= river crab)	<i>Potamocarcinus latifrons</i>
rode duivelskrab (= red devil's crab)	<i>Goniopsis cruentata</i>
wenkkwab (= signalling crab)	<i>Uca</i> spec.
zwemkrab (= swimming crab)	<i>Callinectes bocourti</i>

## G. NOTES ON THE SPECIES

Order Decapoda  
 Suborder Macrura  
 Supersection Natantia  
 Section Penaeidea  
 Family Sergestidae  
 Subfamily Sergestinae

**Acetes americanus** Ortmann, 1893 (textfig. 1)

*Acetes americanus* Holthuis, 1948, p. 1105, fig. 1.

## Coquette Investigations

Station 1, off the mouth of Suriname River, 6° 22' N 55° 06' W; bottom mud; depth 26 m; 11 May 1957. — 2 specimens. (W)

Station 2, off the mouth of Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 98 specimens. (W+L)

Station 23, N.E. of the mouth of Suriname River, 6° 24' N 54° 59.5' W; bottom shells; depth 27 m; 12 May 1957. — 2 specimens. (W)

Station 44, N.E. of the mouth of Suriname River, 6° 18.5' N 54° 51' W; bottom mud; depth 18 m; 13 May 1957. — 12 specimens. (W)

Station 157, off the mouth of Suriname River, 6° 22' N 55° 03' W; bottom mud; depth 24 m; 4 June 1957. — 4 specimens. (W)

Station 260, between the mouths of the Coppename and Suriname Rivers, 6° 40'—6° 41.5' N 55° 26'—55° 41' W; bottom mud, shells and coral; depth 42 m; 20 June 1957. — 6 specimens. (W).

## Museum Leiden

Mouth of Suriname River near Resolutie; in shrimp traps; bottom mud; water muddy brown; salinity 15.89‰; 22 December 1942; D. C. Geijskes. — 5 specimens.

Mouth of Suriname River; obtained at Paramaribo fish market; 1 April 1957; L. B. Holthuis no. 1207. — 1 specimen.

Fishmarket, Cayenne, French Guiana; 10 September 1957; J. Durand. — 3 specimens.

Description. Hansen, 1919, p. 45, figs. 1-7 (as *A. brasiliensis*).

Remarks. The length of the specimens examined varies from 15 to 26 mm. The female from near Resolutie has already been dealt with previously (Holthuis, 1948). The other female specimens resemble it quite closely, but show some variation in the depth of the posterior emargination of the genital sternite: in some specimens it is slightly deeper than figured by me in 1948, in others it is distinctly shallower.

The petasma of the males strongly resembles that figured by Burkenroad (1934, fig. 38) for his *Acetes americanus limonensis*. In my specimens, however, the petasma has the top of the distal lobe of the capitulum provided with minute teeth; such teeth are neither shown in Burkenroad's (1934)

figure nor in that by Hansen (1919, figs. 5, 6) illustrating the petasma of a Brazilian specimen.

Type locality. Mouth of the Pará (= Tocantins) River, Brazil.

Distribution. *Acetes americanus* inhabits the east coast of America from North Carolina (U.S.A.) to Brazil. Several forms have been recognized. The typical *Acetes a. americanus* Ortmann, 1893, is known from Brazil, the type locality being the mouth of the Pará River. The northern form is named *Acetes americanus carolinae* Hansen, 1933 (type locality: off Beaufort Inlet, North Carolina, U.S.A.). Between these extremes intermediate forms occur which give the impression that the northern form gradually

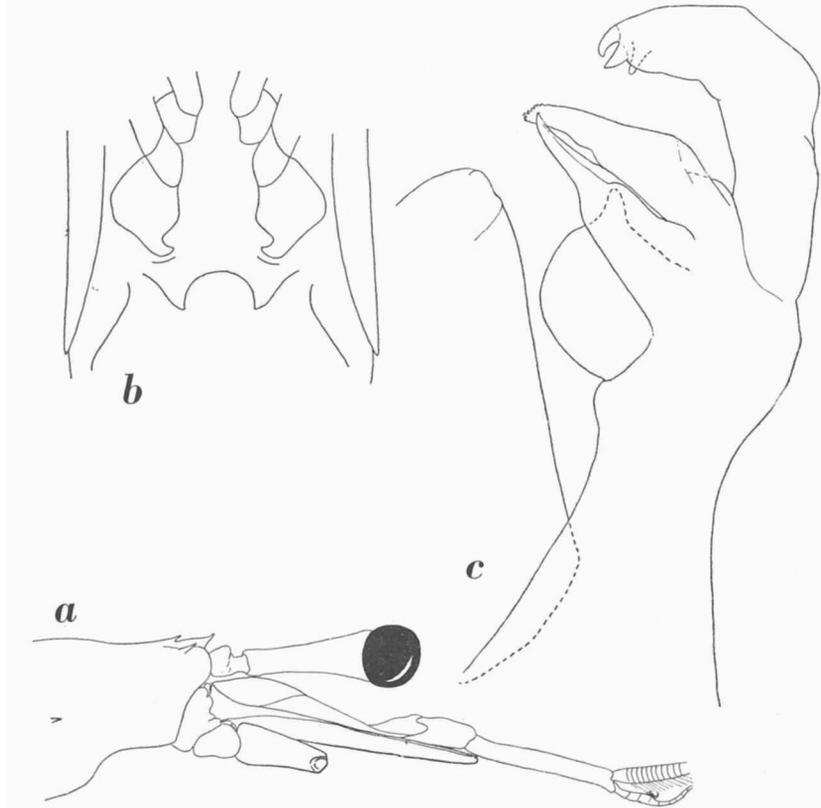


Fig. 1. *Acetes americanus* Ortmann. a, anterior part of body of male in lateral view; b, thelycum; c, tip of petasma. a, c, specimen from "Coquette" Sta. 2; b, specimen from Resolutie. a, b,  $\times 16$ ; c,  $\times 160$ . b, after Holthuis, 1948.

passes into the southern, and that there is no need for coining separate names for all the intermediates (cf. Holthuis, 1948). Therefore the subspecies *Acetes carolinae louisianensis* Burkenroad, 1934 (type locality:

coast of Louisiana between the Mississippi River and Timbalier Island, U.S.A.), and *Acetes americanus limonensis* Burkenroad, 1934 (type locality: mouth of Sweetwater River, Limon Bay, Canal Zone, Panama) are not recognized here.

Occurrence in Suriname. The only previous record of the species from Suriname is that by Holthuis (1948) who reported upon the five above mentioned specimens from near Resolutie.

***Acetes paraguayensis* Hansen, 1919 (textfig. 2)**

Museum Leiden

Saramacca Canal, Paramaribo; 25 November 1957; D. C. Geijskes. — 1 male, 1 female.

Description. Hansen, 1919, p. 46, figs. 8-14.

Remarks. The male specimen is 19 mm, the female 23 mm long. In most characters these specimens closely agree with Hansen's description, but a few differences are to be observed. The second tooth of the rostrum is placed so close to the tip of the rostrum that the latter obtains a bifid

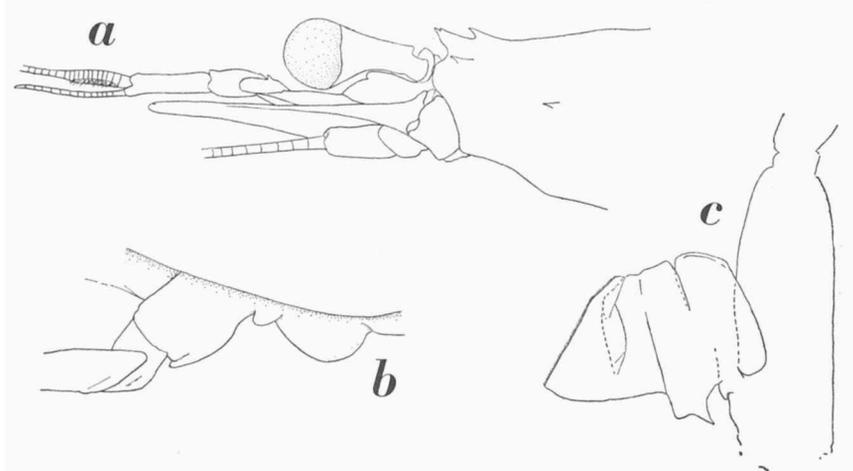


Fig. 2. *Acetes paraguayensis* Hansen. a, anterior part of body in lateral view; b, basal part of third pereopod of female in lateral view; c, petasma. a-c, specimens from Saramacca Canal, Paramaribo. a, b,  $\times 10$ ; c,  $\times 25$ .

appearance. The antennulae are exactly as Hansen described them for the types. The scaphocerite, however, is shorter, in the male reaching only slightly beyond the base of the third antennular segment, and in the female failing to reach the end of that segment.

The coxae of the third legs differ from Hansen's description in that the process which Hansen described as "large, oblong, acute" and figured as

a slender spine, in my specimens is low and rather broad, with a blunt tip. The genital area of the female strongly resembles that of the specimen figured by Hansen. Also the petasma is remarkably like that shown in Hansen's figure. The present figure shows the petasma of the Suriname male extended as far as possible; in a normal position the petasma has a more or less zig-zag shape, being three times longitudinally folded.

The differences found between my specimens and Hansen's original description do not warrant the separation of the Suriname form as a distinct species or subspecies, but a comparative study of an extensive material from both localities remains desirable.

Type localities. Lagoon of Río Paraguay near its junction with Río Paraná, and outlet of Riacho del Oro in Rio de La Plata. As Ringuelet (1949, p. 82) pointed out, the latter locality is doubtful; therefore the former is here selected as the restricted type locality. At the restricted type locality the water is fresh, while the water of Riacho del Oro was said to be feebly brackish.

Distribution. The species is known with certainty from the basin of Río Paraná. Apart from the two type localities the species has been mentioned also from Río Paraná Mini near La Invernada Island, Reconquista Department, Santa Fé Province, Argentina (Ringuelet, 1949). Burkenroad (1945, p. 562) stated that the "*Acetes paraguayensis* group" occurs in the Paraná as well as in the Amazon river systems. The species inhabiting the Amazon basin is evidently the one indicated by Burkenroad (1945, p. 563) as "*Acetes* sp. near *paraguayensis*".

Occurrence in Suriname. The species is now reported for the first time from Suriname. It was taken in the Saramacca Canal together with *Macrobrachium amazonicum* (Heller) and *M. jelskii* (Miers). The water probably was slightly brackish.

#### Subfamily Luciferinae

#### **Lucifer faxoni** Borradaile, 1915

#### Coquette Investigations

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 3 specimens. (W)

Station 15, N.E. of the mouth of the Suriname River, 6° 24.5' N 54° 59.5' W; bottom mud and shells; depth 29 m; 11 May 1957. — 67 specimens. (W + L)

Station 23, N.E. of the mouth of the Suriname River, 6° 24' N 54° 59.5' W; bottom shells; depth 27 m; 12 May 1957. — 2 specimens. (W)

Station 27, N.E. of the mouth of the Suriname River, 6° 45' N 54° 58' W; bottom hard mud and shells; depth 42 m; 12 May 1957. — 1 specimen. (W)

Station 281-282; between the mouths of the Coppename and Suriname Rivers,

6° 46'—6° 46.5' N 55° 36.5'—55° 38' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 3 specimens. (W)

Description. Hansen, 1919, p. 61, pl. 5 fig. 3.

Remarks. The material at hand agrees quite well with Hansen's (1919) account. *Lucifer faxoni* is one of the two species of the genus known from the Atlantic. The other species, *Lucifer typus* H. Milne Edwards, differs from the present form by the far longer eyes.

In his revision of the genus *Lucifer* Borradaile (1915) distinguished ten species, six of which were considered by him to be new. Since most of these new species are based on usually incomplete descriptions and figures published by previous authors, their standing is doubtful, and for this reason all of them, with the exception of *L. faxoni*, have been disregarded by Hansen (1919, p. 50). However, as long as the identity of these species is not definitely settled, their names will remain a threat to the nomenclatorial stability within this genus. By the indication of a proper specimen as the lectotype, several of these species will fall in the synonymy of older species and thus can be put safely out of the way. Six of the species enumerated by Borradaile were stated by him to inhabit the Atlantic Ocean, viz., the four long-eyed forms *Lucifer typus* H. Milne Edwards, 1837 ("Tropical N. Atlantic"), *L. acicularis* Dana, 1852 ("Harbour of Rio de Janeiro"), *L. clausi* Borradaile, 1915 ("Messina"), *L. batei* Borradaile, 1915 ("Throughout the warmer parts of the Atlantic and Central Pacific"), and the two short-eyed forms *L. faxoni* Borradaile, 1915 ("N.W. Atlantic. E. Subtropical Atlantic (Brit. Antarc. Exped.).? Near Philippine Is."), and *L. affinis* Borradaile, 1915 ("Various localities in the Tropical and Subtropical Atlantic, Pacific, and Indian Oceans"). The fact that, as Hansen (1919) pointed out, the only long-eyed species in the Atlantic is *L. typus*, makes it clear that *L. acicularis* Dana and *L. clausi* Borradaile are synonymous with that species. *L. batei* Borradaile also may be made a synonym of *L. typus* by the selection of an Atlantic specimen as its lectotype; to this end I now select as the lectotype of *Lucifer batei* Borradaile a specimen from "Floridastrom: J.N. 62" reported upon by Ortmann (1893, p. 40) as *Lucifer reynaudi*; all of Ortmann's material identified by him as *L. reynaudi*, namely, was assigned by Borradaile to his new species *Lucifer batei*. The position of station "Floridastrom: J.N. 62" of the German Plankton-Expedition is at Bermuda, which thereby becomes the restricted type locality of *Lucifer batei* Borradaile, 1915. The latter species now definitely has become a synonym of *Lucifer typus* H. Milne Edwards, 1837.

As far as the short-eyed forms are concerned, here too a lectotype should be chosen in order to fix their identity. For this reason I now select as

the lectotype of *Lucifer faxoni* Borradaile, 1915, the specimen figured by Faxon (1878, pl. 7 figs. 1-3) under the name *Lucifer* sp., which originated from off Chesapeake Bay, U.S.A. This latter locality now is the restricted type locality of *L. faxoni*. As the lectotype of *Lucifer affinis* Borradaile, 1915, the specimen from "Floridastrom: J.N. 56" reported upon by Ortmann (1893, p. 40) as *Lucifer typus*, is now selected. The restricted type locality of *L. affinis* hereby becomes a locality N.E. of Bermuda, roughly about 35° N 60° W. On account of these lectotype selections *Lucifer affinis* and *L. faxoni* are now subjective synonyms. As the two names have been proposed in the same publication, they are nomenclatorially of equal standing and it is up to the first reviser to select one of them to be used in preference to the other. As far as is known to me such a selection has not yet been made and for that reason the name *Lucifer faxoni* is indicated here to be treated as if it were a senior subjective synonym of *L. affinis*. This selection is made in the interest of stability since the name *L. faxoni* is generally used by modern authors, while that of *L. affinis* is ignored by practically all.

Type locality. See previous paragraph.

Distribution. *Lucifer faxoni* is known from the E. and W. Atlantic and the Indo-West Pacific area (Red Sea, Malay Archipelago, Marshall Islands, Hawaiian Islands, and Fanning Island). The western Atlantic localities are: Off Nova Scotia (41° 07' N 66° 25' W, 40° 10' N 60° 25' W, and 40° 08' N 59° 25' W), N.E. of Bermuda, the coast of the U.S.A. (off Chesapeake Bay, North Carolina, Florida, Louisiana), Bahamas, West Indies (S. E. of Jamaica; St. John), Venezuela (Puerto Cabello), Brazil (mouth of Pará River; near St. Paul's Rock; near Fernando Noronha; near Rio de Janeiro), mid-Atlantic (42° 50' 26" N 41° 48' W, 41° 39' 34" N 39° 21' W, and 4° 30' N 28° 20' W). The species is now reported for the first time from off the Suriname coast.

#### Family Penaeidae

#### Subfamily Solenocerinae

#### **Solenocera atlantidis** Burkenroad, 1939 (textfig. 3)

#### Coquette Investigations

Station 4, off the mouth of the Suriname River, 6° 25' N 55° 05' W; depth 29 m; 11 May 1957. — 6 specimens. (L)

Station 5, off the mouth of the Suriname River, 6° 25' N 55° 04' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 6 specimens. (L)

Station 6, off the mouth of the Suriname River, 6° 24.5' N 55° 03' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 specimen. (L)

Station 8, off the mouth of the Suriname River, 6° 24' N 55° 02.5' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 10 specimens. (L)

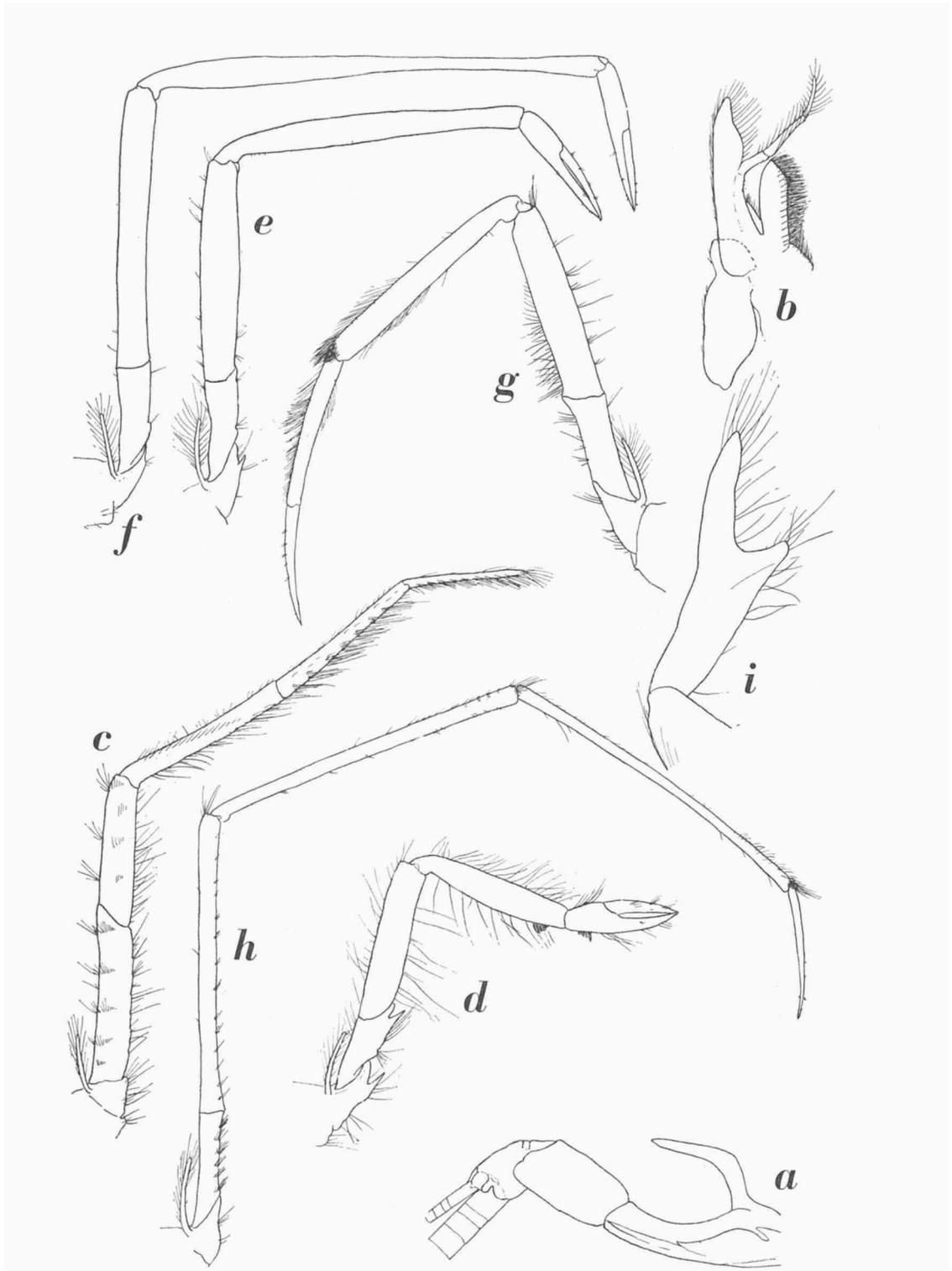


Fig. 3. *Solenocera atlantis* Burkenroad. a, antennular peduncle in lateral view; b, first maxilliped; c, third maxilliped; d, first pereopod; e, second pereopod; f, third pereopod; g, fourth pereopod; h, fifth pereopod; i, epipod of pereopod. a-h,  $\times 7$ ; i,  $\times 20$ .

Station 44, N.E. of the mouth of the Suriname River, 6° 18.5' N 54° 51' W; bottom mud; depth 18 m; 13 May 1957. — 1 specimen. (W)

Station 260, between the mouths of the Coppename and Suriname Rivers, 6° 40'—6° 41.5' N 55° 26'—55° 41' W; bottom mud, shells and coral; depth 42 m; 20 June 1957. — 4 specimens. (W)

Station 267, between the mouths of the Coppename and Suriname Rivers, 6° 42'—6° 41' N 55° 43'—55° 45' W; bottom mud and fine shells; depth 44 m; 20 June 1957. — 5 specimens. (W)

Station 274, between the mouths of the Coppename and Suriname Rivers, 6° 41' N 55° 27' W; bottom shells and coral; depth 42 m; 25 June 1957. — 9 specimens. (W)

Station 276, between the mouths of the Coppename and Suriname Rivers, 6° 41.5' N 55° 31' W; bottom shells and coral; depth 42 m; 25 June 1957. — 11 specimens. (W)

Station 281-282, between the mouths of the Coppename and Suriname Rivers, 6° 46'—6° 46.5' N 55° 36.5'—55° 38' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 3 specimens. (W)

Station 283, between the mouths of the Coppename and Suriname Rivers, 6° 47' N 55° 40' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 6 specimens. (L)

Station 286, off the mouth of the Coppename River, 6° 51' N 55° 49' W; bottom mud, sponges and shells; depth 48 m; 26 June 1957. — 2 specimens. (L)

Station 289, off the mouth of the Coppename River, 6° 52.5' N 55° 53' W; bottom mud and fine shells; depth 49 m; 27 June 1957. — 9 specimens. (L)

Station 298, off the mouth of the Suriname River, 6° 45' N 55° 17' W; bottom mud and fine shells; depth 44 m; 28 June 1957. — 3 specimens. (L)

Station 353, off the mouth of the Suriname River, 6° 45.5' N 55° 14' W; bottom mud and fine shells; depth 44 m; 21 July 1957. — 4 specimens. (W)

Between the mouths of the Coppename and Suriname Rivers, 6° 38'—6° 55' N 55° 13'—55° 40' W; depth 26-53 m; 19 to 22 July 1957. — 1 specimen. (L)

Off Suriname, 1957. — 21 specimens. (W)

Description. Burkenroad, 1939, p. 10, figs. 5-10.

Remarks. The number of females in the present material (82) is far larger than that of the males (19). The females furthermore attain a much greater size, being 32 to 63 mm in my material, while the males are 37 to 43 mm long.

The specimens agree perfectly with Burkenroad's (1939) description and figures of this species.

Type locality. "Atlantis" Sta. 2813, off the coast of Alabama, U.S.A., roughly 30° N 88° W, depth 35 m.

Distribution. Until now *Solenocera atlantidis* was known only from several localities in the Gulf of Mexico near the mouth of the Mississippi River, while Burkenroad (1939) doubtfully referred a specimen from Venezuela to this species. It is now reported for the first time from Suriname.

### ***Solenocera geijskesi* new species (textfigs. 4 and 5)**

Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 female. (L)

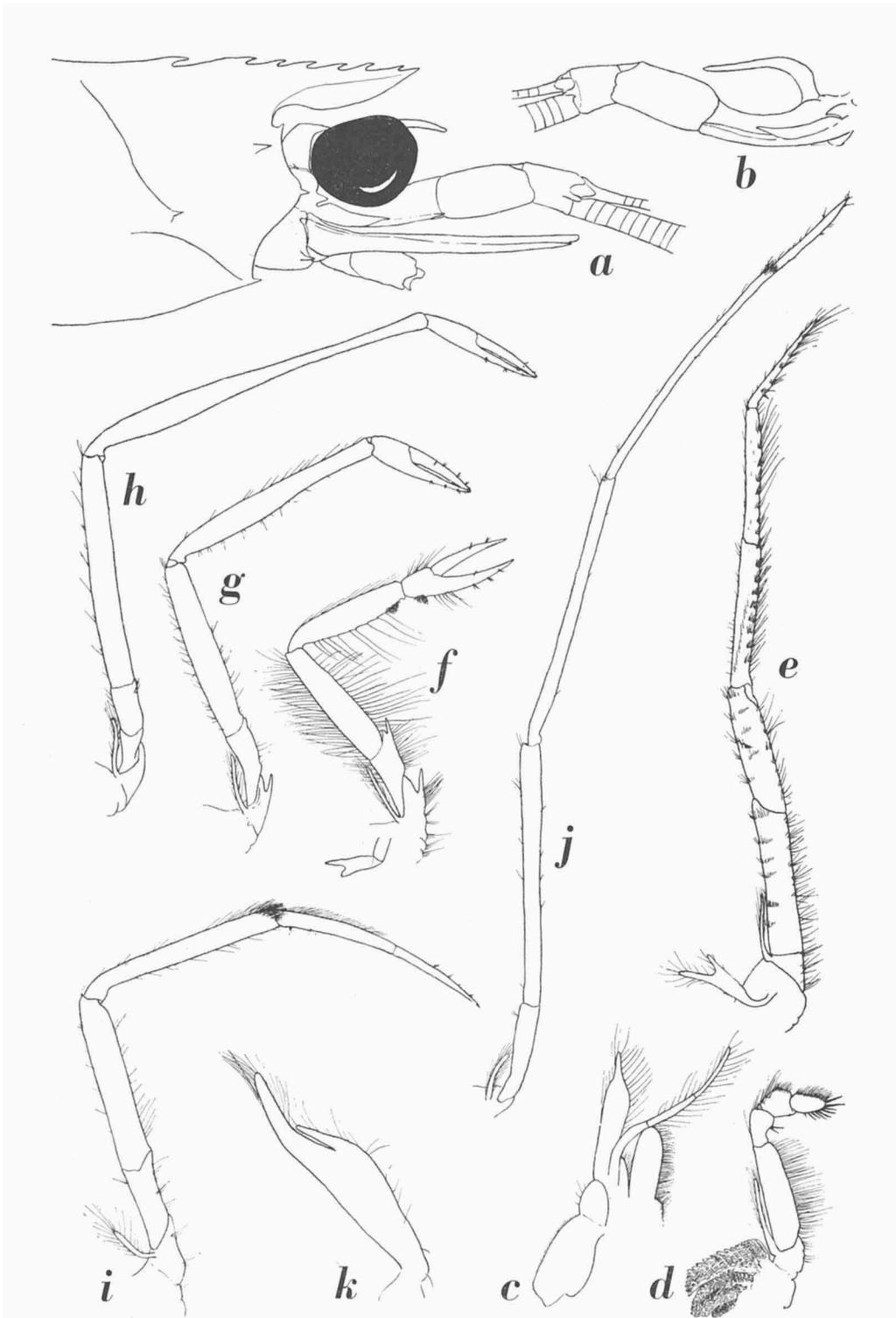


Fig. 4. *Solenocera geijskesi* new species. a, anterior part of body in lateral view; b, antennular peduncle in lateral view; c, first maxilliped; d, second maxilliped; e, third maxilliped; f, first pereopod; g, second pereopod; h, third pereopod; i, fourth pereopod; j, fifth pereopod; k, epipod of pereopod. a-j,  $\times 7$ ; k,  $\times 20$ .

About 20 miles off the Suriname coast between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 male. (L)

Station 260, between the mouths of the Coppename and Suriname Rivers,  $6^{\circ} 40' - 6^{\circ} 41.5' N$   $55^{\circ} 26' - 55^{\circ} 41' W$ ; bottom mud, shells, and coral; depth 42 m; 20 June 1957. — 1 female. (W)

Off Suriname: 1957. — 1 male. (W)

#### Museum Leiden

Off the coast of French Guiana, about  $6^{\circ} 02' N$   $52^{\circ} 25' W$ ; depth 67 m; 6 September 1957; J. Durand no. 379. — 1 female.

Off the coast of French Guiana, about  $5^{\circ} 17' N$   $52^{\circ} 14' W$ ; depth 35 m; 11 July 1958; J. Durand no. 411. — 1 male, 3 females.

Off the coast of French Guiana, about  $5^{\circ} 17' N$   $51^{\circ} 25' W - 5^{\circ} 27' N$   $51^{\circ} 40' W$ ; depth 55-70 m; 7 August 1958; J. Durand no. 424-425. — 2 females.

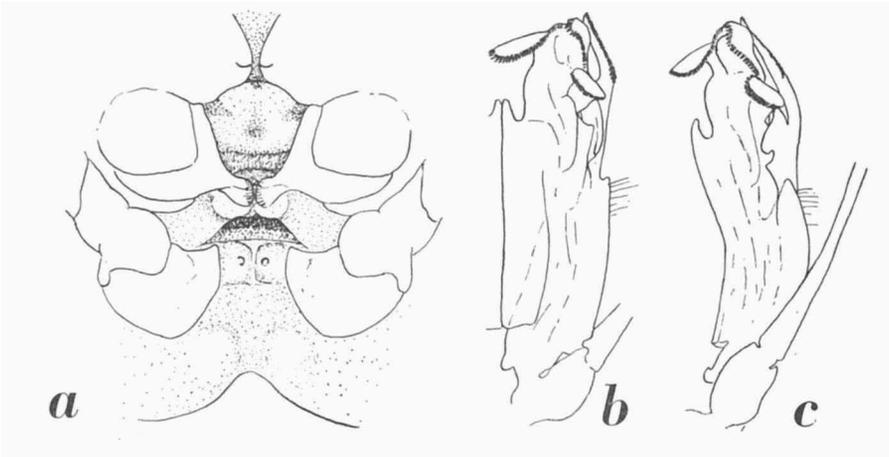


Fig. 5. *Solenocera geijskesi* new species. a, thelycum; b, right petasma in anterior view; c, right petasma in lateral view. a-c,  $\times 8$ .

Description. The males are 34 to 39 mm long, the females 30 to 70 mm.

The rostrum reaches almost to (in the male) or slightly beyond (in the female) the end of the basal segment of the antennular peduncle. It is straight and provided with seven or eight dorsal teeth, three of which are placed behind the orbit. The first tooth, which stands at one third of the length of the carapace behind the orbit, is separated from the second by an interval which is much larger than the spaces between the other teeth. The dorsal surface of the carapace is rounded in its posterior half and shows no median carina. The lateral carina of the rostrum is placed slightly closer to the upper margin than to the lower; the latter is unarmed and distinctly convex. The orbital angle is acute. Postorbital, antennal, hepatic, and pterygostomian spines are present, they are very similar to those of *S.*

*atlantidis*; the pterygostomian spine forms a right angle with the anterior margin of the carapace. The cervical groove, like in *S. atlantidis*, is distinct laterally, but does hardly show in the middorsal line of the carapace. Short hairs are present in the anterior part of the carapace.

The first two abdominal somites have the dorsal surface rounded, while the third shows a rather indistinct dorso-median carina in its posterior half. The posterior margin of the third somite is incised in the middle. The fourth, fifth and sixth somites are sharply carinate throughout dorsally. The posterior margins of the fourth and fifth somites are incised in the middle, while the sixth somite bears a distinct postero-median spine. The shape of the pleurae is practically identical with that in *S. atlantidis*. Also the telson does not show any important difference from that of the latter species.

The eyes of *S. geijskesi* are similar to those of *S. atlantidis*.

In the present species the antennula is more slender than in *S. atlantidis*. The anterolateral tooth of the basal segment reaches distinctly beyond the end of the segment itself. The prosartema is very slender and overreaches the basal antennular segment, it also projects distinctly beyond the eyes; it is relatively far longer than in *S. atlantidis*. The distal two segments of the antennular peduncle resemble those of *S. atlantidis*, but are considerably more slender. Also the antennae are more slender in the new species, but the difference in this respect is very small.

The oral parts strongly resemble those of *S. atlantidis*. The laminate part of the exopod of the first maxilliped, however, is distinctly narrower in its distal part than it is in Burkenroad's species. In the male the third maxilliped reaches with the dactylus and a small part of the propodus beyond the scaphocerite; in the female only part of the dactylus overreaches that scale. The third maxilliped is slender, but less so than in *S. atlantidis*. The dactylus is somewhat shorter than the propodus. The carpus is somewhat longer than the propodus, distinctly longer than the merus, but slightly shorter than the ischium. This maxilliped strongly resembles that of *S. atlantidis*, but has the carpus relatively shorter: in specimens of the latter species I found the carpus always longer than the ischium.

The first pereopod of the male reaches to or somewhat beyond the end of the antennal peduncle, in the female it attains only the base of the scaphocerite or reaches slightly beyond. The fingers are about 2 to 2.5 times as long as the palm. The carpus is slightly longer than the chela and about as long as the merus. Both ischium and basis are provided with a strong inner spine. The second pereopod reaches to the middle of the second or to that of the third segment of the antennular peduncle. The fingers are

almost twice as long as the palm. The carpus is twice to somewhat more than twice as long as the chela, and is distinctly longer than the merus. The inner margin of the basis shows a strong spine, but no such spine is visible on the ischium. The third leg reaches with its fingers or with the chela beyond the scaphocerite. The fingers are somewhat less than 1.5 times as long as the palm. The carpus is about three times as long as the chela and distinctly more than 1.5 times as long as the merus. Neither basis nor ischium bears a spine. The fourth leg reaches to or somewhat beyond the end of the antennal peduncle. The dactylus is shorter than the propodus, and about half as long as the carpus. The merus is shorter than the carpus. The fifth leg is very slender and reaches with the dactylus and a small part of the propodus beyond the scaphocerite. The propodus is slightly shorter than the carpus and distinctly more than 2.5 times as long as the dactylus. The merus is slightly shorter than the carpus. The epipods, which are present at the bases of the first four pereopods, are distinctly bifid, and do not differ much from those of *S. atlantidis*.

The pereopods of the present species strongly resemble those of *S. atlantidis*, but on the whole are less slender. The first leg of *S. atlantidis* has the chela distinctly shorter than the carpus, and the fingers about twice as long as the palm. The second leg of that species reaches almost to or slightly beyond the scaphocerite. The fingers are distinctly less than twice as long as the palm, the carpus is slightly more than twice to 2.5 times as long as the chela and almost 1.5 times as long as the merus. The third leg reaches with the chela or part of the carpus beyond the scaphocerite. The fingers are only slightly longer than the palm. The carpus is about three times as long as the chela and about 1.7 times as long as the merus. The fourth leg almost attains the end of the scaphocerite. In *S. atlantidis* the ratio between the lengths of the various joints is much like in *S. geijskesi*. The fifth leg reaches with the dactylus or part of the propodus beyond the scaphocerite. The propodus is about as long as the carpus and 2.5 times as long as the dactylus.

The main difference between *S. geijskesi* and *S. atlantidis* is found in the shape of the petasma. The tip of the distolateral lobe, instead of being directed distally as in *S. atlantidis*, is recurved here and is directed inwards towards the median line. Furthermore the distoventral lobe shows a well developed free projection, which reaches as far as the distal end of the distolateral lobe. Like in *S. atlantidis*, the distal margin of the distolateral lobe is cut into three lobules, the margin of these bearing spinules. Also the distal part of the external margin of the projection of the distoventral lobe bears spinules.

The thelycum of *S. geijskesi* shows some resemblance to that of *S. atlantidis*. In *S. atlantidis* the sternite of the thirteenth somite, anterior to the medially directed processes at the bases of the fourth pereopods is evenly convex, in *S. geijskesi* a conspicuous ciliated transverse ridge is visible just before these processes. Furthermore the two submedian rounded protuberances of the fourteenth somite, which are placed between the bases of the last pereopods, are evenly rounded in *S. atlantidis*, while they show a distinct tubercle on top in *S. geijskesi*. In *S. geijskesi* there is a ridge between these protuberances; this ridge lacks in *S. atlantidis*.

Types. Holotype is the male specimen from between the mouths of the Nickerie and Coppename Rivers (Leiden Mus. Reg. No. Crustacea D. 11248). The other specimens are paratypes.

Remarks. The present species belongs in the group of the genus *Solenocera* containing the species *S. atlantidis* Burkenroad, *S. necopinum* Burkenroad and *S. vioscai* Burkenroad from the western Atlantic, *S. membranaceum* (Risso) from the eastern Atlantic, and *S. agassizii* Faxon, *S. floreum* Burkenroad, and *S. mutator* Burkenroad from the American westcoast. Of the western Atlantic species *S. geijskesi* is closest to *S. atlantidis*; the differences between the two have been pointed out above. Of the other species it is to *S. floreum* that *S. geijskesi* is most closely related, especially the petasma of the two showing a strong resemblance; the armature of the two outer lobules of the distolateral lobe, however, is different. The thelycum of *S. floreum* also shows the tubercles on the rounded protuberances of the sternite between the last pereopods, but the sculpturation of the thirteenth sternite is different, lacking the transverse ridge of *S. geijskesi*.

#### Subfamily Penaeinae

#### **Penaeus schmitti** Burkenroad, 1936 (textfig. 6a)

*Penaeus schmitti* Lindner, 1957, pp. 153, 154.

#### Coquette Investigations

About 20 miles off the Suriname coast between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 2 males. (L)

Station 176, off the mouth of the Coppename River, 6° 20' N 55° 49.5' W; bottom mud and shells; depth 27 m; 6 June 1957. — 1 female. (L)

Station 203, N.E. of the mouth of the Suriname River, 6° 22'—6° 23' N 54° 56'—55° 05' W; bottom mud; depth 24 m; 11 June 1957. — 1 male. (W)

Station 208, off the mouth of the Suriname River, 6° 22' N 55° 03'—55° 08' W; bottom mud; depth 24 m; 11 June 1957. — 1 female. (W)

Station 293, off the mouth of the Suriname River, 6° 27'—6° 25' N 55° 05'—55° 10' W; bottom mud and shells; depth 26 m; 28 June 1957. — 3 males. (W + L)

## Museum Leiden

Mouth of Suriname River near Braamspunt; obtained from fishermen; 5 April 1957; L. B. Holthuis no. 1218. — 2 males.

Description. Burkenroad, 1936, p. 315, figs. 1a, 2, 3.

Remarks. The size of the specimens examined varies from 174 to 222 mm.

Colour. Living specimens of this species were noted to be of a pale bluish grey colour.

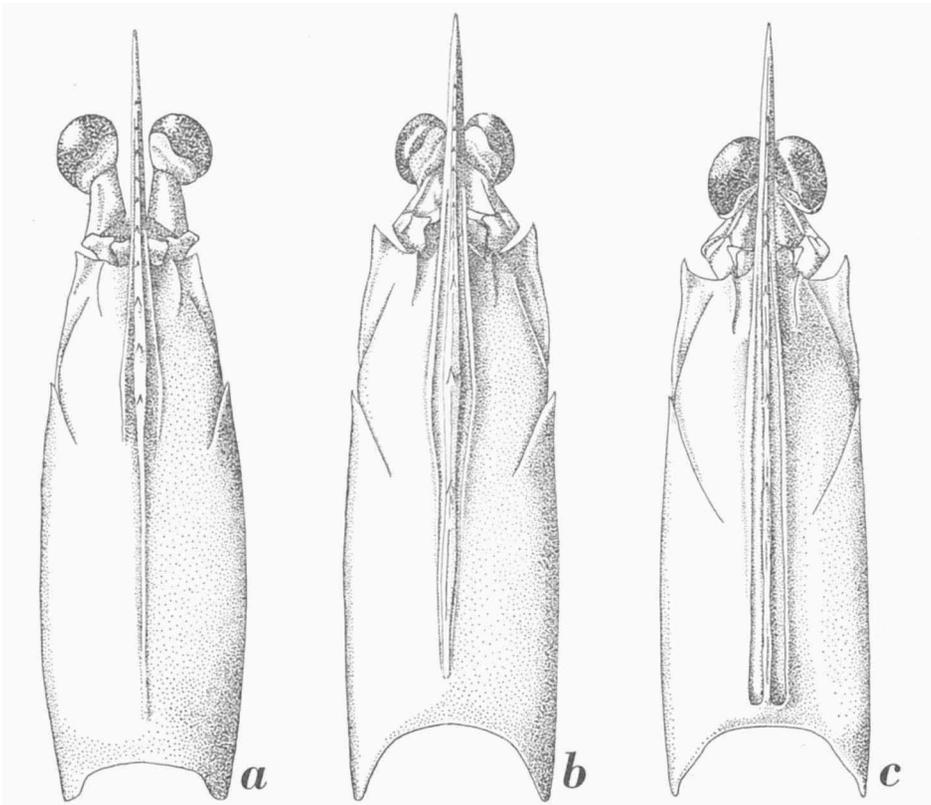


Fig. 6. Carapace in dorsal view. a, *Penaeus schmitti* Burkenroad, male from "Coquette" Sta. 203; b, *Penaeus aztecus* Ives, female from "Coquette" Sta. 254; c, *Penaeus brasiliensis* Latreille, female from "Coquette" Sta. 251. a-c,  $\times 1.3$ . W. C. G. Gertenaar del.

Type locality. Kingston Bay, Jamaica.

Distribution. *Penaeus schmitti* is closely related to the "White Shrimp", *Penaeus setiferus* (L.), of the coast of the U.S.A., and until 1936 the two were treated as a single species. *P. setiferus* is known from the Atlantic coast of North America between New York, U.S.A. and Vera Cruz, Mexico, and furthermore from Cuba and Jamaica. *P. schmitti* has a more southern

distribution: Antilles (Cuba, Jamaica, Haiti, Santo Domingo, St. Thomas), Panama, Colombia, Venezuela, British, Dutch, and French Guiana, and Brazil (south to Santa Catharina).

Occurrence in Suriname. This species is apparently quite scarce near the Suriname coast and near the mouths of the rivers. During a visit to the fishermen's village of Braamspunt at the mouth of the Suriname River, a few specimens of *P. schmitti* were found among the enormous quantities of *Xiphopenaeus kroyeri* that were being dried there to be sold later on. Also in the Coquette material the number of specimens is relatively small. It may be more abundant farther offshore. Lindner (1957) stated that this species and *Penaeus aztecus* together comprise less than 1% of the total catch of shrimp in Suriname, the larger part being formed by *Xiphopenaeus*.

**Penaeus aztecus** Ives, 1891 (textfig. 6b)

*Penaeus aztecus* Holthuis, 1948, p. 1104; Holthuis, 1950a, pp. 27, 35; Lijding, 1956, p. 108; Lindner, 1957, pp. 153, 154.

Coquette Investigations

About 20 miles N.N.W. of the mouth of the Coppename River; depth 31 m; 1-5 April 1957; first voyage. — 4 males, 1 female. (L)

Between the mouths of the Nickerie and Coppename Rivers, about 20 miles offshore; depth 27 m; 15-20 April 1957; third voyage. — 2 females. (L)

About 20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; sixth voyage. — 2 females. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 4 males, 7 females. (W)

Station 6, off the mouth of the Suriname River, 6° 24.5' N 55° 03' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 juvenile. (W)

Station 15, N.E. of the mouth of the Suriname River, 6° 24.5' N 54° 59.5' W; bottom mud and shells; depth 29 m; 11 May 1957. — 1 male. (W)

Station 20, N.E. of the mouth of the Suriname River, 6° 28' N 54° 57.5' W; bottom shells; depth 31 m; 11 May 1957. — 1 female. (W)

Station 36, N.E. of the mouth of the Suriname River, 6° 55' N 54° 54' W; bottom mud; depth 55 m; 12 May 1957. — 1 male, 1 female. (W)

Station 62, off N.W. French Guiana, 6° 02' N 53° 41' W; bottom shells; depth 26 m; 21 May 1957. — 1 male. (L)

Station 63, off N.W. French Guiana, 6° 01' N 53° 34' W; bottom mud and shells; depth 26 m; 21 May 1957. — 2 males, 5 females. (L)

Station 65, off N.W. French Guiana, 6° 01.5' N 53° 30' W; bottom hard mud; depth 26 m; 21 May 1957. — 1 male, 2 females. (L)

Station 77, off N.W. French Guiana, 5° 54' N 53° 15' W; bottom mud and shells; depth 29 m; 21 May 1957. — 10 males, 9 females. (L)

Station 104, N.E. of Enfant Perdu, French Guiana, 5° 07' N 51° 58' W; bottom mud; depth 29 m; 24 May 1957. — 6 males, 5 females. (L)

Station 138, N.E. of the mouth of the Suriname River, 6° 21' N 54° 56' W; bottom mud; depth 22 m; 30 May 1957. — 1 male, 2 females. (W)

Station 144, N.E. of the mouth of the Suriname River, 6° 22.5' N 54° 58' W; bottom mud; depth 26 m; 30 May 1957. — 3 males, 1 female. (W)

N.N.E. of the mouth of the Suriname River; depth 22 m; 1-3 June 1957. — 4 males, 4 females. (L)

Station 172, between the mouths of the Coppename and Suriname Rivers, 6° 20.5' N 55° 42' W; bottom mud; depth 27 m; 6 June 1957. — 1 male. (W)

Station 216, N.W. of the mouth of the Marowijne River, 6° 41.5' N 54° 16' W; bottom mud; depth 44 m; 14 June 1957. — 1 male, 1 female. (W)

Station 251, between the mouths of the Coppename and Suriname Rivers, 6° 41' N 55° 30' W; bottom mud and shells; depth 42 m; 19 June 1957. — 1 female. (W)

Station 254, between the mouths of the Coppename and Suriname Rivers, 6° 41' N 55° 39' W; bottom mud and shells; depth 44 m; 19 June 1957. — 1 female. (W)

Station 293, off the mouth of the Suriname River, 6° 27'—6° 25' N 55° 05'—55° 10' W; bottom mud and shells; depth 26 m; 28 June 1957. — 9 males, 23 females. (W + L)

### Museum Leiden

Cocos Polder, Coronie; in ditch to the inside of the outer (sea) dike; muddy with little, if any, vegetation; 11 April 1957; L. B. Holthuis no. 1238. — 3 juveniles.

Cocos Polder, Coronie; in ditch near the projected pumping installation; muddy bottom; 11 April 1957; L. B. Holthuis no. 1240. — 1 juvenile.

Mouth of Coppename River near Coppename Punt; 25 October 1949; leg. R. M. J. Wirtz. — 1 specimen.

Mouth of Suriname River near plantation "Purmerend", N. of Leonsberg, N. of Paramaribo; in pool behind the river dike and near the shore of the river itself; 1 April 1957; L. B. Holthuis no. 1208. — 13 juveniles.

Mouth of Suriname River near Braamspunt; received from fishermen; 5 April 1957; L. B. Holthuis no. 1218. — 3 females.

Mouth of Suriname River near Resolutie; in shrimp traps; bottom mud; salinity 15.89‰; 22 December 1942; D. C. Geijskes. — 110 specimens.

Mouth of the Suriname River; bought at the fishmarket of Paramaribo; 1 March 1953; D. C. Geijskes. — 1 specimen.

Mouth of the Suriname River; bought at the fishmarket of Paramaribo; 1 April 1957; L. B. Holthuis no. 1207. — 1 female.

Mouth of the Suriname River; April 1957; H. W. Lijding. — 3 females. Suriname River near Paramaribo; bank of the river at spring-tide; December 1949; D. C. Geijskes. — 14 juveniles.

Paramaribo, road to the sea; in the stomach of a kingfisher, *Chloroceryle americana* (Gmelin); 26 October 1957; F. Haverschmidt. — 1 badly damaged specimen.

Suriname River at 10 miles above its mouth; 11 February 1954; H. W. Lijding. — 5 specimens.

Near "Suriname Rivier" lightvessel; trawled; 12 and 13 January 1953; H. W. Lijding. — 1 female.

Near "Suriname Rivier" lightvessel; 1955; H. W. Lijding. — 1 male, 9 females.

Off the coast of Suriname, 5 to 8 miles E. of "Suriname Rivier" lightvessel; bottom soft brown mud; depth 3.5 m; 13 July 1953; D. C. Geijskes & H. W. Lijding. — 4 specimens.

In ditches and ponds of the Fishery Experiment Station "Matappica" at the Matappica Canal, N. of the Commewijne River; 6 April 1957; L. B. Holthuis no. 1221. — 24 specimens.

0.2 km S. of the coast near the Wiawia Bank; swamp behind first shore ridge; depth 0.1 to 0.3 m; salinity 21 to 33.76‰; 11 and 13 November 1948; 1948-1949 Suriname Expedition nos. 2613 and 3412. — 94 juveniles.

Suriname. — 1 female.

Off the coast of French Guiana near Cayenne; June-July 1955; J Durand. — 3 specimens.

Fishmarket, Cayenne, French Guiana; 10 September 1957, and 4 May 1958; J. Durand. — 15 specimens.

#### Museum Hamburg

Paramaribo; J. Michaelis; received 31 January 1899. — 24 specimens.

Description. Burkenroad, 1939, p. 34, figs. 20, 21, 24, 28-33.

Remarks. The specimens in the present collection vary greatly in size. The largest male is 187 mm long and the largest female 206 mm. The juvenile specimens (length 70 mm or less) cannot be identified with complete certainty, since the sexual organs are not fully developed; however, there are no indications that they should belong to a species different from *P. aztecus*.

All the fullgrown specimens belong to Burkenroad's (1939, p. 34) Form B. The adrostral grooves are rather narrow and ill-defined posteriorly, a character which is constant in the present material and which even serves as an easy means to distinguish Suriname specimens of this species from *P. brasiliensis*, which in the Suriname material has the adrostral grooves wide and ending in a sharply defined transverse posterior margin.

Colour. The colour of living specimens was noted to be uniformly greyish brown; no red spot is visible on the abdomen.

Type locality. Vera Cruz, Mexico.

Distribution. The range of the species extends from New Jersey, U.S.A. to Uruguay.

Occurrence in the Guianas. This is the most common *Penaeus* found in Suriname; it occurs closer to the shore than the other species of this genus. It is found in waters with a rather wide range of salinity, having been collected in the brackish estuaries of the rivers as well as in pools, which, because of a strong evaporation, have a salinity higher than sea water. The specimens found inshore and in the estuaries are as a rule not full-grown. Such medium and small sized specimens occur in small numbers in the catches of *Xiphopenaeus kroyeri* made in the mouths of the rivers. In the fish ponds of the Fishery Experiment Station "Matappica", *Penaeus aztecus* proved to be the only species of Penaeidae present; the Matappica specimens measured 15 to 102 mm. The adult specimens (up to 206 mm) are as a rule found farther offshore in greater depths (22 to 55 m).

The species was reported for the first time from Suriname by Holthuis (1948) who dealt with the above mentioned specimens from Resolutie. The juveniles from near the Wiawia Bank were reported upon by Holthuis (1950). Lindner (1957) remarked that in Suriname the catch of this species

and of *P. schmitti* form less than 1% of the total shrimp catch. According to Lijding (1956) this percentage is 2, being far higher in the estuaries of the Coppename and Suriname Rivers during the months of July and August. Dr. J. Durand, Institut Français d'Amérique Tropicale, Cayenne, sent me some material of this species from off the coast of French Guiana, where it was collected in depths between 25 and 60 m, as a rule being found in smaller depths than the next species. Graham's (1955, p. 41, pl. 5 fig. 9) "Short Feelered Prawn" from British Guiana evidently is the present species.

***Penaeus brasiliensis*** Latreille, 1817 (textfig. 6c)

Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 30 miles offshore; depth 37 m; 29 April—3 May 1957; fifth voyage. — 2 females. (L)

Station 1, off the mouth of the Suriname River, 6° 22' N 55° 06' W; bottom mud; depth 26 m; 11 May 1957. — 1 male, 2 females. (L)

Station 28, N.E. of the mouth of the Suriname River, 6° 48' N 54° 54' W; bottom shells; depth 46 m; 12 May 1957. — 1 male, 1 female. (W)

Station 31, N.E. of the mouth of the Suriname River, 6° 50' N 54° 53.5' W; bottom hard mud and shells; depth 49 m; 12 May 1957. — 1 male, 1 female. (W)

Station 33, N.E. of the mouth of the Suriname River, 6° 52' N 54° 53' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 male. (W)

Station 36, N.E. of the mouth of the Suriname River, 6° 55' N 54° 54' W; bottom mud; depth 55 m; 12 May 1957. — 1 male. (W)

Station 140, N.E. of the mouth of the Suriname River, 6° 24'—6° 22' N 54° 55'—54° 59' W; bottom mud; depth 26 m; 30 May 1957. — 1 female. (W)

Station 251, between the mouths of the Coppename and Suriname Rivers, 6° 41' N 55° 30' W; bottom mud and shells; depth 42 m; 19 June 1957. — 3 males, 4 females. (W)

Station 254, between the mouths of the Coppename and Suriname Rivers, 6° 41' N 55° 39' W; bottom mud and shells; depth 44 m; 19 June 1957. — 4 males, 2 females. (L)

Station 279, between the mouths of the Coppename and Suriname Rivers, 6° 44' N 55° 33' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 1 male. (W)

Station 289, N.E. of the mouth of the Coppename River, 6° 52.5' N 55° 53' W; bottom mud and fine shells; depth 49 m; 27 June 1957. — 3 males. (L)

Station 297, off the mouth of the Suriname River, 6° 45'—6° 50.5' N 55° 17'—55° 27' W; bottom mud and fine shells; depth 44 m; 28 June 1957. — 8 males, 5 females. (W)

Station 298, off the mouth of the Suriname River, 6° 45' N 55° 17' W; bottom mud and fine shells; depth 44 m; 28 June 1957. — 6 males, 11 females. (L)

Suriname; 1957. — 1 male. (W)

Museum Leiden

Off the coast of French Guiana near Cayenne; June—July 1955; J. Durand. — 2 specimens.

Description. Burkenroad, 1939, p. 27, figs. 16, 17, 22.

Remarks. All the specimens studied are fullgrown or almost fullgrown, the size of the males varying between 150 and 191 mm, that of the females between 172 and 216 mm.

The difference in the shape of the adrostral grooves of Suriname specimens of this and the previous species has already been discussed under *P. aztecus*. The differences in the thelycum and petasma of the two species check very well with Burkenroad's (1939) account.

Colour. The colour of living specimens is reddish with a dark red spot on each side of the abdomen near the third abdominal somite. This coloration is an easy means for the distinction of living specimens of this species from those of *P. aztecus*. Dr. Durand of Cayenne also found this character very helpful in sorting his material from French Guiana.

Type locality. "Les côtes du Brésil" (Latreille, 1817).

Distribution. The species is known to inhabit the western Atlantic between Bermuda and Rio de Janeiro, Brazil, being more common in the southern part of its range. Till 1939 it was not distinguished from its close relatives *P. aztecus* Ives and *P. duorarum* Burkenroad, so that the old records of the species as a rule are not to be relied upon.

Occurrence in Suriname and French Guiana. *Penaeus brasiliensis* is now reported for the first time from Suriname. It proves to be far less common here than *P. aztecus*, being found in deeper waters. While practically all of the examined "Coquette" material of *P. aztecus* was taken between 22 and 31 m and that species furthermore occurs in the shallow coastal and estuarine waters, the far larger part of the catches of *P. brasiliensis* are from between 37 and 55 m. Furthermore none of the specimens collected close inshore could be identified with certainty as belonging to the present species. Dr. J. Durand of the Institut Français d'Amérique Tropicale, Cayenne, informed me that off the coast of French Guiana *P. brasiliensis* is also found at greater depths than *P. aztecus*, being caught there mostly between 40 and 69 m.

### ***Penaeus duorarum* Burkenroad, 1939**

#### Coquette Investigations

Station 27, N.E. of the mouth of the Suriname River, 6° 45' N 54° 58' W; bottom hard mud and shells; depth 42 m; 12 May 1957. — 1 female. (W)

Description. Burkenroad, 1939, p. 31, figs. 18, 19, 23, 25-27.

Remarks. The only specimen of this species in the present collection is an incomplete female the abdomen of which is lacking. The length of the carapace is 65 mm. It is certainly surprising to find this single incomplete specimen of *P. duorarum* among the extensive series of grooved shrimp collected by the "Coquette", all the other specimens being either *P. aztecus* or *P. brasiliensis*.

In the present specimen the thelycum has the shape typical for the species. The adrostral grooves of the carapace are wide clearly defined throughout their course with a distinct posterior margin, thereby resembling the Suriname specimens of *P. brasiliensis*, which, however, as a rule have these grooves slightly wider posteriorly.

Type locality. "Atlantis" Sta. 2813, off the coast of Alabama, U.S.A., roughly 30° N 88° W, depth 35 m.

Distribution. The species has been reported from the east coast of America (Bermuda and North Carolina to Brazil) and from West Africa (Mauritania to Angola). Until now it has not been reported from Suriname, where it seems to be extremely rare.

### **Trachypenaeus constrictus** (Stimpson, 1871)

#### Coquette Investigations

About 20 miles off the Suriname coast between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 male, 2 females. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 1 female. (W)

Station 5, off the mouth of the Suriname River, 6° 25' N 55° 04' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 female. (L)

Station 8, off the mouth of the Suriname River, 6° 24' N 55° 02.5' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 female. (L)

Station 250, between the mouths of the Coppename and Suriname Rivers, 6° 41' N 55° 26.5' W; bottom mud, shells and coral; depth 42 m; 19 June 1957. — 2 impregnated females. (W)

Station 260, between the mouths of the Coppename and Suriname Rivers, 6° 40'—6° 41.5' N 55° 26'—55° 41' W; bottom mud, shells and coral; depth 42 m; 20 June 1957. — 4 impregnated females. (L)

Station 267, N.E. of the mouth of the Coppename River, 6° 42'—6° 41' N 55° 43'—55° 45' W; bottom mud and fine shells; depth 44 m; 20 June 1957. — 1 female. (W)

Station 279, between the mouths of the Coppename and Suriname Rivers, 6° 44' N 55° 33' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 1 impregnated female. (W)

Station 280, between the mouths of the Coppename and Suriname Rivers, 6° 45' N 55° 35' W; bottom mud and fine shells; depth 48 m; 26 June 1957. — 1 impregnated female. (W)

Station 283, between the mouths of the Coppename and Suriname Rivers, 6° 47' N 55° 40' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 1 female. (L)

Station 284, between the mouths of the Coppename and Suriname Rivers, 6° 49' N 55° 42' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 1 female. (W)

Station 353, off the mouth of the Suriname River, 6° 45.5' N 55° 14' W; bottom mud and fine shells; depth 44 m; 21 July 1957. — 3 males and 5 females. (W)

Between the mouths of the Coppename and Suriname Rivers, 6° 19'—6° 55' N 55° 13'—55° 40' W; depth 26-53 m; 19-22 July 1957. — 6 females, 4 of which impregnated. (L)

Description. A. Milne Edwards & Bouvier, 1909, p. 232, textfigs. 60-63, pl. 5 figs. 7-10, pl. 6 figs. 1, 2.

Remarks. In the present material the females (17 specimens, 32 to 78 mm long) are far more numerous than the males (4 specimens, 45 to 59 mm long). The female from Sta. 284 was found in the stomach of an octopus.

Type localities. Harbour of Beaufort, North Carolina, U.S.A., and Charleston Harbor, South Carolina, U.S.A. Restricted by Schmitt (1935, p. 131) to Beaufort.

Distribution. Until now the species has been recorded from Bermuda, from the east and south coasts of the U.S.A. (from off Chesapeake Bay to Texas), from Puerto Rico and from Sombrero Island. It is now reported for the first time from Suriname, so that its known range of distribution is considerably extended.

### ***Trachypenaeus similis* (Smith, 1885)**

#### Coquette Investigations

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 1 female. (W)

Station 32, N.E. of the mouth of the Suriname River, 6° 51' N 54° 53.5' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 female. (W)

Station 44, N.E. of the mouth of the Suriname River, 6° 18.5' N 54° 51' W; bottom mud; depth 18 m; 13 May 1957. — 3 females. (W)

Station 227, between the mouths of the Suriname and Marowijne Rivers, 6° 50' N 54° 24' W; bottom mud; depth 53 m; 15 June 1957. — 1 female. (L)

Station 360, off the mouth of the Suriname River, 6° 19'—6° 20' N 55° 15'—55° 14' W; bottom mud and shells; depth 26 m; 22 July 1957. — 1 female. (W)

N.N.W. of "Suriname Rivier" lightvessel, 7° 2' N 55° 40' W; depth 55 m; 8 August 1957. — 14 females. (L)

#### Museum Leiden

Off the coast of French Guiana, 4° 45' N 51° 28' W; depth 20 m; 7 August 1958; J. Durand no. 420. — 1 female.

Description. Burkenroad, 1934a, p. 96, figs. 10, 11.

Remarks. The specimens are 27 to 101 mm long. They agree quite well with the descriptions given of the species in the literature. The thelycum has the median plate between the bases of the fourth pereopods with a deeply sunken T- or V-shaped groove on the upper surface, and not with a straight longitudinal groove like the one shown in Burkenroad's (1934) fig. 10. It is interesting to note that the present material does not contain any males.

Type locality. Gulf of Paria, 10° 37' 40" N 61° 42' 40" W; 57 m depth.

Distribution. The species is known from the Gulf coast of the United States and Mexico (from W. Florida to the Gulf of Campeche), from the northern Antilles (Cuba, Puerto Rico, Vieques, St. Thomas), Courtown

Key (Colombia), and the Gulf of Paria near Trinidad. It is now reported for the first time from Suriname and French Guiana.

***Xiphopenaeus kroyeri*** (Heller, 1862) (textfig. 7)

"Garnalen of Steurkrabben" Teenstra, 1835, vol. 2, p. 442.

"Garnalen, Sarre Sarre" Kappler, 1881, p. 143.

*Palaemon* Kappler, 1887, p. 200.

*Xiphopenaeus kroyeri* Holthuis, 1948, p. 1103; Holthuis, 1950a, p. 35.

*Xiphopenaeus kroyeri* Lijding, 1956, p. 108.

*Xiphopenaeus kroyeri* Lindner, 1957, pp. 153, 154, 156.

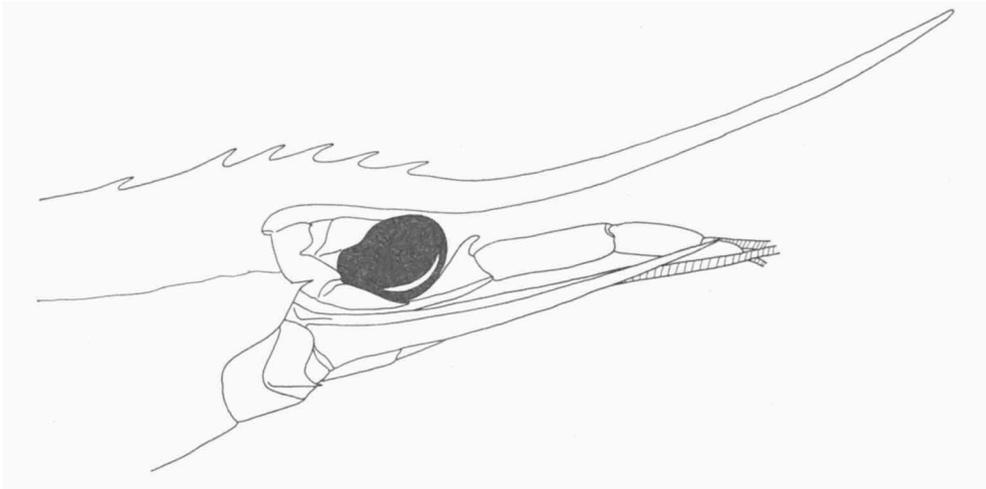


Fig. 7. *Xiphopenaeus kroyeri* (Heller). Anterior part of body in lateral view, specimen from "Coquette" Sta. 44.  $\times 5$ .

#### Coquette Investigations

Between the mouths of the Nickerie and Coppename Rivers, about 20 miles offshore; depth 27 m; 15-20 April 1957; third voyage. — 2 specimens. (L)

Near "Suriname Rivier" lightvessel; depth 7 m; 3 May 1957; fifth voyage. — 3 specimens. (L)

About 20 miles N. of the mouth of the Suriname River; depth 27 m; 6-9 May 1957; sixth voyage. — 2 specimens. (L)

Station 1, off the mouth of the Suriname River,  $6^{\circ} 22' N 55^{\circ} 06' W$ ; bottom mud; depth 26 m; 11 May 1957. — 101 specimens. (W)

Station 2, off the mouth of the Suriname River,  $6^{\circ} 23' N 55^{\circ} 05.5' W$ ; bottom mud; depth 27 m; 11 May 1957. — 8 specimens. (W)

Station 44, N.E. of the mouth of the Suriname River,  $6^{\circ} 18.5' N 54^{\circ} 51' W$ ; bottom mud; depth 18 m; 13 May 1957. — 387 specimens. (W)

Station 49, N.E. of the mouth of the Suriname River,  $6^{\circ} 04' N 54^{\circ} 51' W$ ; bottom mud; depth 5 m; 13 May 1957. — 2 specimens. (W)

Station 157, off the mouth of the Suriname River,  $6^{\circ} 22' N 55^{\circ} 03.5' W$ ; bottom mud; depth 24 m; 4 June 1957. — 4 specimens. (L)

Station 166, between the mouths of the Coppename and Suriname Rivers, 6° 18' N 55° 26' W; bottom mud and shells; depth 18 m; 6 June 1957. — 1 specimen. (W)

#### Museum Leiden

Mouth of the Nickerie River; bought on the fish market of Nieuw Nickerie; September 1953; D. C. Geijskes. — 34 specimens.

Sea coast near the mouth of the Nickerie River; 16 September 1953; D. C. Geijskes. — 25 specimens.

Coppename Punt, mouth of the Coppename River; 25 October 1949; R. M. J. Wirtz. — 10 specimens.

Saramacca Punt, mouth of the Coppename River; 2 April 1957; L. B. Holthuis no. 1215. — 9 specimens.

Mouth of Suriname River near Braamspunt; 10 April 1957; L. B. Holthuis no. 1217. — 7 specimens.

Mouth of Suriname River near Resolutie; bottom mud; salinity 15.89‰; 22 December 1942; D. C. Geijskes. — 16 specimens.

Mouth of the Suriname River; bought on the fish market at Paramaribo; 1 March 1933 and 1 March 1953; D. C. Geijskes; 1 April 1957; L. B. Holthuis no. 1207. — 98 specimens.

Suriname River at Paramaribo; caught near the Fisheries Service pier; in trap-net; 7 April 1957; L. B. Holthuis no. 1224. — 3 specimens.

Near "Suriname Rivier" lightvessel; 1953; H. W. Lijding. — 3 specimens.

About 5 to 8 miles E. of "Suriname Rivier" lightvessel; bottom soft brown mud; depth 3.5 m; 13 July 1953; D. C. Geijskes & H. W. Lijding. — 14 specimens.

Mouth of the Warappa Creek, N. of the Commewijne River; bottom mud; salinity 6 to 13‰; 11 December 1942; D. C. Geijskes. — 26 specimens.

Suriname. — 1 specimen.

Coast of French Guiana near Cayenne; 1955; J. Durand. — 6 specimens.

Fishmarket, Cayenne, French Guiana; 10 September 1957; J. Durand. — 7 specimens.

Description. Burkenroad, 1934a, p. 103, fig. 12; Schmitt, 1935, p. 132, fig. 5.

Vernacular names. The Suriname name for this species is "redi sara-sara" (= red prawn), or "bigi sara-sara" (= big prawn).

Remarks. The length of the present specimens varies from 22 to 135 mm.

Colour. Fresh specimens of this species were noted to be whitish with the ventral part yellowish, while sometimes the yellow colour extends over the entire body, always being most distinct ventrally. Dark chromatophores are scattered all over; when they are expanded the animal obtains a greyish colour which then dominates over the yellow. The tip of the rostrum and the flagella are reddish. The legs are pinkish or yellowish-orange. The pleopods and uropods are yellowish at the base, becoming pink distally. The telson and the sixth abdominal somite are sometimes pink.

Type locality. Rio de Janeiro, Brazil.

Distribution. The species is known from the western Atlantic between South Carolina, U.S.A., and Brazil. It is of economic importance in the southern United States, in Venezuela, the Guianas and Brazil. The species

was reported from British Guiana by Graham (1955, p. 38, pl. 5 fig. 10; 1956, p. 170, figs. 171, 172) as "Coarse Shrimp" or "Large Prawn".

Occurrence in Suriname. *Xiphopenaeus kroyeri* is the most common commercial shrimp of Suriname and has already been mentioned as such by Lijding (1956) and Lindner (1957). It is caught in huge numbers in the estuaries of the rivers and sold fresh or dried on the markets of various towns. The shrimps are usually caught with trap-nets. As a rule a number of these nets, fastened to heavy wooden stakes, are placed in a transverse row, one next to the other, in the mouth of the river in not too deep water. When the nets are not in use, they are raised and hung over the horizontal upper bars which connect the vertical stakes; they are left there to dry. At incoming or outgoing tide the nets are lowered into the water, where they unfold and are kept open by the strong current. With the tidal currents numerous shrimp and small fish come up or down the river mouth, and large quantities are caught in the trap-nets. The fishermen, in small boats which they fasten to the stakes, stay with the nets and about every 15 minutes the contents of the bag at the end of the net is emptied into their boats. Between collecting, the catch is sorted. Depending upon the circumstances the shrimp is sold fresh, is cooked and dried, is put in cold storage, or is ground up to "trassi". At the markets of towns like Paramaribo and Nieuw Nickerie shrimp is sold fresh. In a few places, like Boskamp at the mouth of the Coppename River and in Paramaribo, there are facilities for cold storage so that the shrimp can be kept and has not to be sold immediately. Most of the shrimp, however, is dried. At the village of Braampunt at the mouth of the Suriname River, I had the opportunity to observe the process of cooking and drying of shrimp: the fresh shrimp is brought in by small boats when the trap-net fishing is finished. It is then boiled in salt water in large drums. The cooked shrimps are spread out on trays made of loosely woven bamboo strips, which are placed on wooden frames out in the open so that they are about 50 cm above ground level. In the sun, with the wind passing over as well as under the trays, the shrimps dry in about 3 to 5 days; at intervals the drying shrimp is turned over with a kind of lance-shaped wooden ladles. When the shrimps are fully dried they are put out on a pile on the ground and by threshing them with a wooden club the shells are separated from the dried meat. The clean dried meat then is packed in bags and sent to the market. It also may be ground up for shrimp meal. The amount of shrimp caught is considerable: in 1950 in the estuaries of the Coppename and Suriname Rivers alone about 300 tons of shrimp was caught (Reyntjes, 1953, p. 85); Lindner (1957) estimated the total annual catch of shrimp in Suriname at 1 million pounds.

The same author mentioned that 600 fishermen work full-time there to catch both shrimp and fish. According to Lijding (1957, p. 117) about 150 trap-nets are in use for the shrimp fishery in Suriname. Dried shrimp has been exported in the past on a moderate scale. Lijding (1957, p. 118) indicated that in 1953 10.000 kg, and in 1954 8.026 kg of dried shrimp were exported; most of these were sent to Trinidad. At present *Xiphopenaeus* is peeled and frozen on a rather large scale for export to the U.S.A. and the Caribbean region.

According to Lijding (1956, p. 108) along the Suriname coast the concentration of *Xiphopenaeus* is greatest in depths down to 7 m, though bigger specimens are more numerous in depths of 7 to 20 m. The shrimps penetrate quite deep into the estuaries, going up the rivers especially far in the dry season. Dr. J. Durand, Institut Français d'Amérique Tropicale, Cayenne, informed me that in French Guiana "Les *Xiphopenaeus kroyeri* sont récoltées toute l'année dans les "barrières chinoises" de Cayenne, mais on les retrouve aussi dans toute la bande côtière jusqu'aux fonds de 25 mètres environ".

The first Suriname record of *Xiphopenaeus* is evidently that by Teenstra. Teenstra (1835, p. 442) remarked that on the Paramaribo market prawns are sold which resemble those caught in the fresh waters of the southern Netherlands (probably *Palaemon longirostris* H. Milne Edwards is meant), but being larger; he reported these Suriname prawns to be caught in the Matappica and nearby creeks. They are described by him as possessing a rostrum and having the eyes bulging, black and almost as big as a small pea. It is evident that these prawns are *Xiphopenaeus*, though Teenstra's statement that they attain a length of 2 palms (about 200 mm) is somewhat exaggerated. The specimens examined by me do not exceed 140 mm. The prawns mentioned by Kappler (1881, 1887) as being caught with nets in the brackish water of the river estuaries, also belong here, at least partly. Holthuis in 1948 dealt with the above mentioned Resolutie specimens, and in 1950 with those from the Warappa Creek and Coppename Punt.

### ***Sicyonia dorsalis* Kingsley, 1878**

#### Coquette Investigations

About 20 miles N.N.W. of the mouth of the Coppename River; depth 31 m; 1-5 April 1957; first voyage. — 1 female. (L)

Between the mouths of the Nickerie and Coppename Rivers, 20 miles offshore; depth 27 m; 15-20 April 1957; third voyage. — 3 females. (L)

About 20 miles N. of the mouth of the Marowijne River; depth 27 m; 23-27 April 1957; fourth voyage. — 2 females. (L)

Near "Suriname Rivier" lightvessel; depth 7 m; 3 May 1957; fifth voyage. — 1 female. (L)

N.N.W. of the mouth of the Marowijne River, 20 miles offshore; depth 27 m; 29 April-3 May 1957; fifth voyage. — 5 females. (L)

About 20 miles N. of the mouth of the Suriname River; depth 27 m; 6-9 May 1957; sixth voyage. — 1 male, 11 females. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 13 males, 15 females. (W)

Station 15, N.E. of the mouth of the Suriname River, 6° 24.5' N 54° 59.5' W; bottom mud and shells; depth 29 m; 11 May 1957. — 1 female. (W)

Station 32, N.E. of the mouth of the Suriname River, 6° 51' N 54° 53.5' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 female. (W)

Station 86, N. of Isle du Salut, French Guiana, 5° 49.5' N 53° 09' W; bottom rocky with mud, shells and coral; depth 27 m; 22 May 1957. — 1 female. (L)

Station 144, N.E. of the mouth of the Suriname River, 6° 22.5' N 54° 58' W; bottom mud; depth 26 m; 30 May 1957. — 2 males, 3 females. (W)

Station 157, off the mouth of the Suriname River, 6° 22' N 55° 03.5' W; bottom mud; depth 24 m; 4 June 1957. — 2 males, 5 females. (W + L)

Station 159, off the mouth of the Suriname River, 6° 22' N 55° 02.5' W; bottom mud; depth 26 m; 4 June 1957. — 5 males, 34 females. (W + L)

Station 187, N.E. of the mouth of the Suriname River, 6° 23' N 54° 56' W; bottom mud; depth 27 m; 10 June 1957. — 1 male, 2 females. (W)

Station 212, between the mouths of the Suriname and Marowijne Rivers, 6° 45' N 54° 30' W; bottom mud; depth 26 m; 14 June 1957. — 1 female. (W)

Station 218, N.W. of the mouth of the Marowijne River, 6° 42' N 54° 13.5' W; bottom mud; depth 26 m; 14 June 1957. — 1 female. (W)

Station 223, off the mouth of the Marowijne River, 6° 49' N 53° 59' W; bottom mud and shells; depth 48 m; 15 June 1957. — 1 female. (W)

Station 224, off the mouth of the Marowijne River, 6° 51' N 54° 03' W; bottom mud; depth 51 m; 15 June 1957. — 1 female. (W)

Station 227, between the mouths of the Suriname and Marowijne Rivers, 6° 50' N 54° 24' W; bottom mud; depth 53 m; 15 June 1957. — 1 female. (W)

Station 260, between the mouths of the Coppename and Suriname Rivers, 6° 40'—6° 41.5' N 55° 26'—55° 41' W; bottom mud, shells and coral; depth 40 m; 20 June 1957. — 1 male. (W)

Between the mouths of the Coppename and Suriname Rivers, 6° 19'—6° 55' N 55° 13'—55° 40' W; depth 26-53 m; 19-22 July 1957. — 1 male. (L)

#### Museum Leiden

Off the coast of French Guiana, about 5° 17' N 52° 14' W; depth 35 m; 11 July 1958; J. Durand no. 411. — 6 males, 12 females.

Description. Burkenroad, 1934a, p. 121, figs. 13, 14.

Remarks. Burkenroad (1934a) made the position of the species clear and provided a good description, with which the present specimens agree quite well.

The preponderance in the present material of females (102 specimens, 18-57 mm long) over males (32 specimens, 14-53 mm long) is quite striking.

Type locality. Fort Jefferson, Dry Tortugas, Florida, U.S.A.

Distribution. *Sicyonia dorsalis* is known with certainty from the Atlantic

and Gulf coasts of the U.S.A. (North and South Carolina, Florida, Louisiana, Texas), and Colombia (Sabanilla). The species has been mentioned from several other localities, but these records may be based on material of the related western Atlantic species *S. stimpsoni* Bouvier or *S. wheeleri* Gurney. *Sicyonia dorsalis* is now reported for the first time from Suriname and French Guiana.

***Sicyonia stimpsoni* Bouvier, 1905**  
Coquette Investigations

Station 29, N.E. of the mouth of the Suriname River, 6° 49' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 1 male. (W)

Station 31, N.E. of the mouth of the Suriname River, 6° 50' N 54° 53.5' W; bottom hard mud and shells; depth 49 m; 12 May 1957. — 1 male. (W)

Station 32, N.E. of the mouth of the Suriname River, 6° 51' N 54° 53.5' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 male. (W)

Station 33, N.E. of the mouth of the Suriname River, 6° 52' N 54° 53' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 male. (W)

Station 36, N.E. of the mouth of the Suriname River, 6° 55' N 54° 54' W; bottom mud; depth 55 m; 12 May 1957. — 1 male, 1 female. (W)

Station 331, between the mouths of the Coppename and Suriname Rivers, 6° 51' N 55° 25' W; bottom mud and shells; depth 53 m; 20 July 1957. — 1 male. (W)

Station 334, between the mouths of the Coppename and Suriname Rivers, 6° 50' N 55° 22' W; bottom sand; depth 53 m; 20 July 1957. — 1 female. (L)

Station 337, off the mouth of the Suriname River, 6° 49'—6° 47' N 55° 21'—55° 18' W; bottom mud and fine shells; depth 49-53 m; 21 July 1957. — 4 males. (L)

Museum Leiden

Off the coast of French Guiana, about 6° 47' N 53° 10' W; depth 105 m; 25 July 1958; J. Durand no. 417. — 1 female.

Description. A. Milne Edwards & Bouvier, 1909, p. 253, textfigs. 86-88, pl. 8 figs. 4-13 (as *S. dorsalis* Kingsley).

Remarks. It is interesting to note that in the present form, in contrast with the previous species, the males (10 specimens, length 32-44 mm) are far more numerous than the females (3 specimens, 43 to 44 mm long).

The specimens agree with A. Milne Edwards & Bouvier's (1909) description and figures of this species, which they incorrectly identified with *S. dorsalis* Kingsley. The material is also in good agreement with Burkenroad's (1934a, pp. 123-125) account of the species.

The pleurae of the abdominal somites end in a distinct spine, which in the first four is curved outwards. In my material of *S. dorsalis*, the first four pleurae instead of these outwards directed spines show an angle or short tooth in the anterior part of their distal margin. In the third and fourth abdominal somites of *S. dorsalis* (not in the second as stated by Burkenroad, 1934a, p. 124) there is a second angle or tooth on the pleural

margin; this second angle is directed posteriorly and situated at the postero-lateral angle of the pleura, it is more acute than the anterior tooth. No such posterior angle or tooth is to be observed in my material of *S. simpsoni*. The transverse groove on the pleurae of the second abdominal somite of the present species does not reach the upper margin of the somite, but about halfway the base of the pleura and the dorsal line of the segment it curves forwards and stops abruptly. A short groove which starts at the antero-dorsal part of the segment curving downwards and backwards does not contact the just mentioned pleural groove. In *S. dorsalis* these two grooves form an uninterrupted single groove, which extends from the dorso-median line down to the tip of the pleura.

In my material of *S. simpsoni* the dorsal margins of the fourth and fifth abdominal somites both end in a distinct high and acutely pointed tooth. In *S. dorsalis* no trace of such a tooth is found in the fourth somite, while in the fifth the margin ends in a low rectangular tooth.

The distoventral lobe of the petasma in *S. simpsoni* is simple and not bifurcated as in *S. dorsalis*.

In some of my specimens of *S. simpsoni* an orange-coloured ring is visible in the posterior half of the branchial regions of the carapace, just below the posterior dorso-median tooth. In the specimen from French Guiana this ring is of a brownish colour inside, yellowish white in the outer half.

The name *Sicyonia simpsoni* was originally a manuscript name of A. Milne Edwards's. It was published for the first time by Bouvier (1905, p. 748), who provided a short description, so that the name is available as from 1905 and has to be cited with Bouvier as the author. Later A. Milne Edwards & Bouvier (1909) incorrectly synonymized the species with *S. dorsalis* Kingsley. Burkenroad (1934a, p. 121) was the first to reestablish *S. simpsoni* as a distinct species.

Type locality. "Mer des Antilles . . . entre 60 et 110 brasses" (Bouvier, 1905). A. Milne Edwards & Bouvier (1909, p. 255) when dealing with a specimen from Sta. 273, made the remark: "Un mâle adulte de 25 mm. environ, très normal et pouvant servir de type." This specimen is now definitely selected to be the lectotype of *Sicyonia simpsoni* Bouvier, 1905. By this action the type locality is restricted to off Barbados, British West Indies, 13° 03' 05" N 59° 36' 18" W, depth 103 fathoms.

Distribution. The species is known with certainty from the coast of the U.S.A. (North Carolina to Texas), Mexico (Gulf of Campeche), and the West Indies (Cuba, Puerto Rico, Dominica, Barbados, Grenada), while it is now reported for the first time from Suriname and French Guiana.

**Sicyonia typica** (Boeck, 1864)

## Coquette Investigations

Station 267, N.E. of the mouth of the Coppename River, 6° 42'—6° 41' N 55° 43'—55° 45' W; bottom mud and fine shells; depth 44 m; 20 June 1957. — 1 female. (L)

Station 306, off the mouth of the Coppename River, 6° 54' N 56° 14' W; bottom shells and coral; depth 49 m; 7 July 1957. — 1 female. (W)

Station 350, off the mouth of the Suriname River, 6° 47.5' N 55° 15' W; bottom mud and fine shells; depth 46 m; 21 July 1957. — 1 male. (W)

N.N.W. of "Suriname Rivier" lightvessel, 7° 2' N 55° 40' W; depth 55 m; 8 August 1957. — 1 male. (L)

Description. Bate, 1888, Rep. Voy. Challenger, Zool., vol. 24, p. 294, pl. 43 figs. 2, 3 (as *S. carinata*); A. Milne Edwards & Bouvier, 1909, p. 251, pl. 8 figs. 1-3 (as *S. Edwardsi*).

Remarks. The specimens at my disposal, which are 60 to 74 mm long, agree with the descriptions given of this species in the literature. They differ from A. Milne Edwards & Bouvier's (1909, pl. 8 fig. 1) figure in that the dorsal carina of the fifth abdominal segment ends posteriorly in a distinct high tooth; furthermore the pleurae of the first four abdominal somites show a ventrally directed acute tooth on the distal margin. In these respects the specimens show more resemblance to Bate's (1888, pl. 43 fig. 2) illustration of the species. Schmitt's (1935, fig. 6) figure does not represent this species, but is a copy of A. Milne Edwards & Bouvier's (1909, pl. 8 fig. 4) figure of *S. stimpsoni*.

Type locality. Erroneously given as Molde Fjord, west coast of Norway, the type specimen evidently being incorrectly labelled.

Distribution. The actual range of the species is West Atlantic and includes the coast of the United States (North Carolina, Florida), the West Indies (the Cayman Sea, Cuba, St. Thomas, Flanagan Passage, Sombrero, Antigua), and Brazil south to Rio de Janeiro. It is now reported for the first time from Suriname.

## Section Caridea

## Family Palaemonidae

**Palaemon (Nematopalaemon) schmitti** Holthuis, 1950 (textfig. 8)

*Palaemon schmitti* Holthuis, 1950, p. 97; Holthuis, 1950a, p. 36.

*Palaemon (Nematopalaemon) schmitti* Holthuis, 1950b, p. 9; Holthuis, 1952, p. 169, pl. 43.

"Witte berie" Lijding, 1957, pp. 119, 121.

## Coquette Investigations

About 20 miles N. of the mouth of the Suriname River; depth 27 m; 6-9 May 1957; sixth voyage. — 2 specimens. (L)

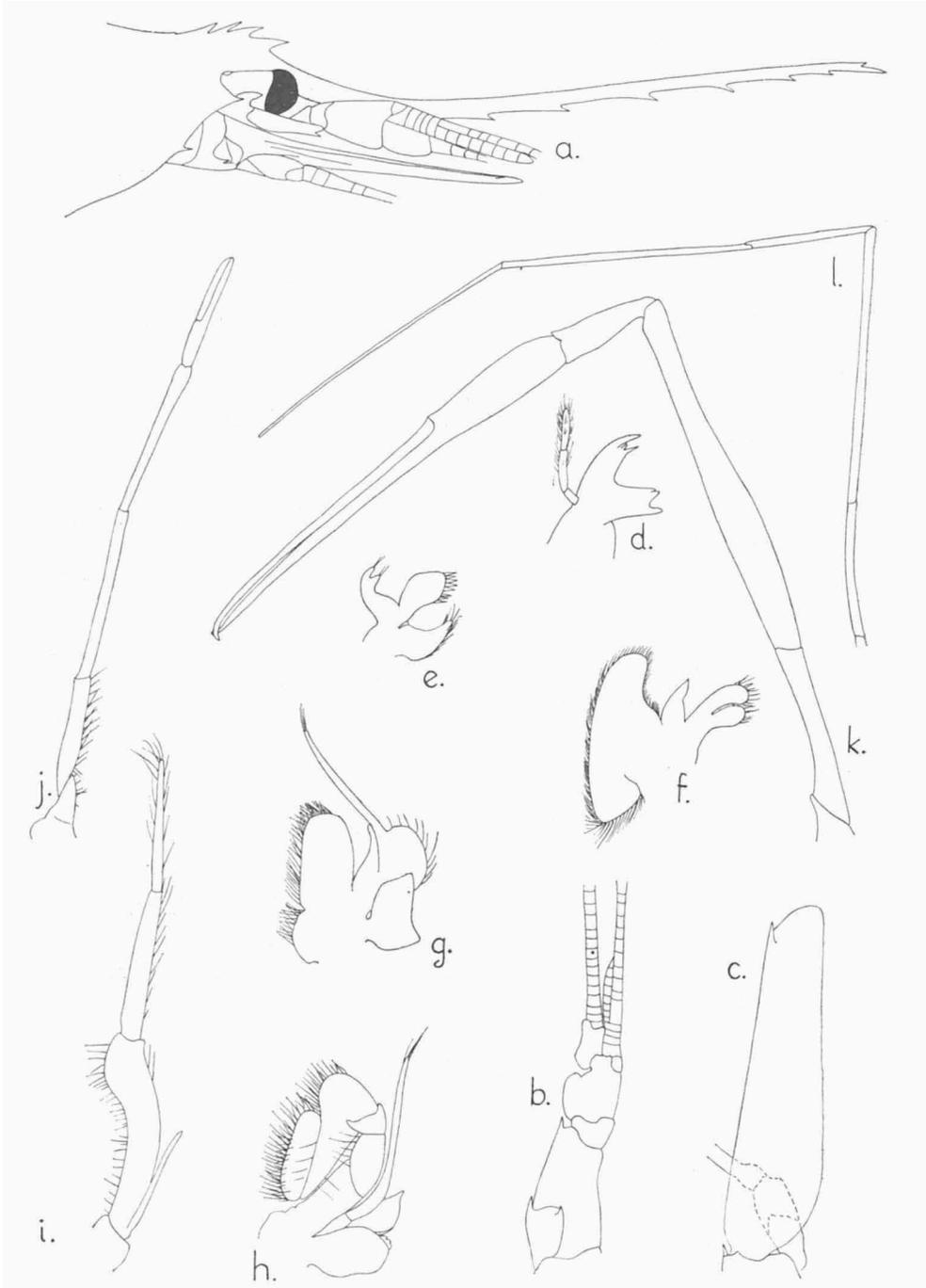


Fig. 8. *Palaemon (Nematopalaemon) schmitti* Holthuis. a, anterior part of body in lateral view; b, antennula; c, antenna; d, mandible; e, maxillula; f, maxilla; g, first maxilliped; h, second maxilliped; i, third maxilliped; j, first pereiopod; k, second pereiopod; l, third pereiopod (dactylus broken). Specimen from Suriname River near Resolutie. a,  $\times 5$ ; b, c, j-l,  $\times 7$ ; d-i,  $\times 10$ . After Holthuis, 1952.

Station 1, off the mouth of the Suriname River, 6° 22' N 55° 06' W; bottom mud; depth 26 m; 11 May 1957. — 5 specimens. (W + L)

Station 26, N.E. of the mouth of the Suriname River, 6° 40' N 54° 58' W; bottom shells; depth 37 m; 12 May 1957. — 1 ovigerous female. (W)

Station 44, N.E. of the mouth of the Suriname River, 6° 18.5' N 54° 51' W; bottom mud; depth 18 m; 13 May 1957. — 1 ovigerous female. (W)

Station 49, N.E. of the mouth of the Suriname River, 6° 04' N 54° 51' W; bottom mud; depth 5 m; 13 May 1957. — 12 specimens (2 ovigerous). (W)

Station 166, between the mouths of the Coppename and Suriname Rivers, 6° 18' N 55° 26' W; bottom mud and shells; depth 18 m; 6 June 1957. — 11 specimens (2 ovigerous). (W)

Station 167, between the mouths of the Coppename and Suriname Rivers, 6° 18.5' N 55° 28' W; bottom mud and shells; depth 18 m; 6 June 1957. — 3 specimens (1 ovigerous). (W)

#### Museum Leiden

Mouth of the Nickerie River; bought on the fish market of Nieuw Nickerie; September 1953; D. C. Geijskes. — 116 specimens (21 ovigerous).

Sea coast near the mouth of the Nickerie River; 16 September 1953; D. C. Geijskes. — 40 specimens.

Mouth of the Coppename River near Saramacca Punt; 2 April 1957; L. B. Holthuis no. 1215. — 19 specimens (5 ovigerous).

Mouth of the Suriname River near Braamspunt; caught in trap-nets; 4 and 5 April 1957; L. B. Holthuis nos. 1217 and 1218. — 26 specimens (3 ovigerous).

Mouth of the Suriname River near Resolutie; from trap-nets; bottom mud; salinity 15.89‰; 22 December 1942; D. C. Geijskes. — about 100 specimens (including ovigerous females).

Mouth of the Suriname River; bought on the Paramaribo fish market; 1 March 1953; D. C. Geijskes; 1 April 1957; L. B. Holthuis no. 1207. — 69 specimens (2 ovigerous females in 1957 lot).

Suriname River, 10 miles above its mouth; 11 February 1954; H. W. Lijding. — 14 specimens.

Suriname River at Paramaribo, shore at spring-tide; December 1949; D. C. Geijskes. — 5 specimens.

Suriname River at Paramaribo; caught in trap-net near the Fisheries Service pier; 7 April 1957; L. B. Holthuis no. 1224. — 19 specimens (17 ovigerous).

Between "Suriname Rivier" lightvessel and the coast; 27 July 1953; D. C. Geijskes. — 6 specimens (3 ovigerous).

Mouth of the Warappa Creek near Matappica, N. of the Commewijne River; bottom mud; salinity 6 to 13‰; 11 December 1942; D. C. Geijskes. — 28 specimens (including ovigerous females).

Fishmarket, Cayenne, French Guiana; 10 September 1957; J. Durand. — 70 specimens.

Description. Holthuis, 1952, p. 169, pl. 43.

Vernacular name. The native name of the species in Suriname is "Witti bere" (= white belly).

Remarks. The ovigerous females examined range in length between 59 and 80 mm; they seem to occur throughout the year, since in the present material they are represented from the months of April, May, June, July, September, and December.

Colour. The colour of fresh specimens is white with a few red chromato-

phores on the carapace and abdomen. These chromatophores, when extended, may give the animals a pinkish tinge. The pinkish colour is most distinct in the rostrum, along the hind margin of the abdominal somites, and in the tail fan. The flagella and legs are pink, the pleopods very pale pink, and the eggs yellowish.

Type locality. Mouth of the Suriname River near Resolutie; the type specimens being those listed above from that locality.

Distribution. I do not know of any records of this species outside British and Dutch Guiana. It is most probable that the "Long-beaked Prawn" of British Guiana which Graham (1955, p. 40, pl. 6 fig. 12) identified with *Spirontocaris* sp., actually belongs to the present species. Graham, namely, described her material as follows: "Its rostrum is of great length, very slender, and saw-edged below along the outer two thirds of its length. At its base it has four teeth above and none below. The swimming feet are long, and the walking feet differ from those of the large prawn [= *Xiphopenaeus*] in having only the first two pairs chelate. The second pair is the longest. The other three pairs are very slender and easily broken. In colour, the body is paler than in the large prawn, and there are no brown freckles. The tail fin and all the feet are pinkish; if the female is carrying any eggs, they are yellow. Length 2½ ins." This description agrees so closely with *Palaemon schmitti* that there can hardly be any doubt that the Long-beaked Prawn is this species. Graham's figure, however, shows an animal with a rather high rostrum which, apart from a dorsal crest of about seven teeth, shows two more teeth on the upper margin of the rostrum between the basal crest and the tip. This drawing is evidently incorrect as it does not check with the description.

Lindner (1957, pp. 2, 21) reported *Palaemon schmitti* from British Guiana, where according to him the native name is "fine shrimp" or "white bellies".

Occurrence in Suriname. *Palaemon schmitti* occurs in large quantities in the river estuaries and, next to *Xiphopenaeus kroyeri*, it is commercially the most important prawn in Suriname. It is distinguished by the native fishermen from *Xiphopenaeus*, and different names are applied to the two species; some people, however, consider *Palaemon* to be the young of *Xiphopenaeus*. Among catches of *Palaemon schmitti* offered for sale on the markets one finds now and then a few specimens of *Hippolysmata oplophoroides* Holthuis; this is quite similar to the occasional occurrence of *Penaeus aztecus* among *Xiphopenaeus*.

Like *Xiphopenaeus*, *Palaemon schmitti* is sold fresh on the various markets in Suriname, but is also dried; sometimes it is ground up for shrimp meal.

It is caught in the same way and in the same localities as *Xiphopenaeus*. Though Lindner (1957, p. 21) discussed the economic importance of *Palaemon schmitti* for British Guiana, where it proves to be the most abundant commercial prawn, he did not mention its fishery in Suriname. Previous Suriname records of the species are: mouth of the Suriname River near Resolutie (Holthuis, 1950, 1950a, 1952), Suriname River near Paramaribo (Holthuis, 1950a, 1952), Warappa Creek (Holthuis, 1950a, 1952), Suriname (Lijding, 1957).

***Palaemonetes (Palaemonetes) carteri* Gordon, 1935 (textfig. 9)**

*Palaemonetes carteri* Holthuis, 1948, p. 1113; Holthuis, 1950a, pp. 32, 36.

*Palaemonetes (Palaemonetes) carteri* Holthuis, 1952, p. 218, pl. 52 figs. c-o, pl. 53 figs. a-c; Maccagno & Cucchiari, 1957, p. 70, fig. 17.

Museum Leiden

On highway between Coronie and Paramaribo at 19.7 to 19.8 km E. of Coronie; swamp creek with clear brown water, salinity 0.08‰, pH 5.5; 21 December 1948; 1948-1949 Suriname Expedition no. 4574. — 4 specimens.

Artificial pool on highway between Coronie and Paramaribo at 21.6 km E. of Coronie; clear water, salinity 0.09‰, pH 8; 20 December 1948; 1948-1949 Suriname Expedition no. 4387. — 28 specimens (10 ovigerous).

Ditch along the highway near Carl François, 86 km W. of Paramaribo; 2 April 1957; L. B. Holthuis no. 1209. — 37 specimens (1 ovigerous).

Pool along highway near Groningen, 45 km W. of Paramaribo; 2 April 1957; L. B. Holthuis no. 1216. — 2 specimens (1 ovigerous).

Saramacca Canal, Paramaribo; 27 June and 4 July 1958; D. C. Geijskes. — 8 specimens.

Small ditches along secondary road, Charlesburg near Paramaribo; 8 April 1957; L. B. Holthuis, no. 1226. — 31 specimens.

Paramaribo; August 1911; W. C. van Heurn. — 36 specimens.

Small creek near the highway from Paramaribo to Domburg, slightly N.W. of Para River; 31 March 1957; L. B. Holthuis no. 1201. — 5 specimens (2 ovigerous).

Ditch along Pericaweg, Lelydorp, S. of Paramaribo; stagnant water; 31 March 1957; L. B. Holthuis no. 1206. — 95 specimens (9 ovigerous).

Swamp along Meursweg near Onverwacht, S. of Lelydorp; 31 March 1957; L. B. Holthuis no. 1205. — 22 specimens.

Swamp near Bersaba near Republiek; 3 September 1955; P. Wagenaar Hummelinck no. 642. — 76 specimens (1 ovigerous).

Coropina Creek near Bersaba; fresh water; 9 April 1957; L. B. Holthuis no. 1232. — 54 specimens (2 ovigerous).

Side creek of Coropina Creek near railroad, Republiek; water brown, acid, fast flowing, pH 5, bottom sand with dead leaves; 4 September 1948; 1948-1949 Suriname Expedition no. 26. — 38 specimens.

Side creek of Coropina Creek near Vierkinderen near Republiek; open savanna creek, water flowing, pale brown, pH 5.5-6; bottom kaolin-clay with rather much vegetable mould; 5 September 1948; 1948-1949 Suriname Expedition nos. 79, 81, 82. — 228 specimens (1 ovigerous).

Coropina Creek near Republiek; fresh water; 9 April 1957; L. B. Holthuis no. 1231. — 201 specimens (15 ovigerous).

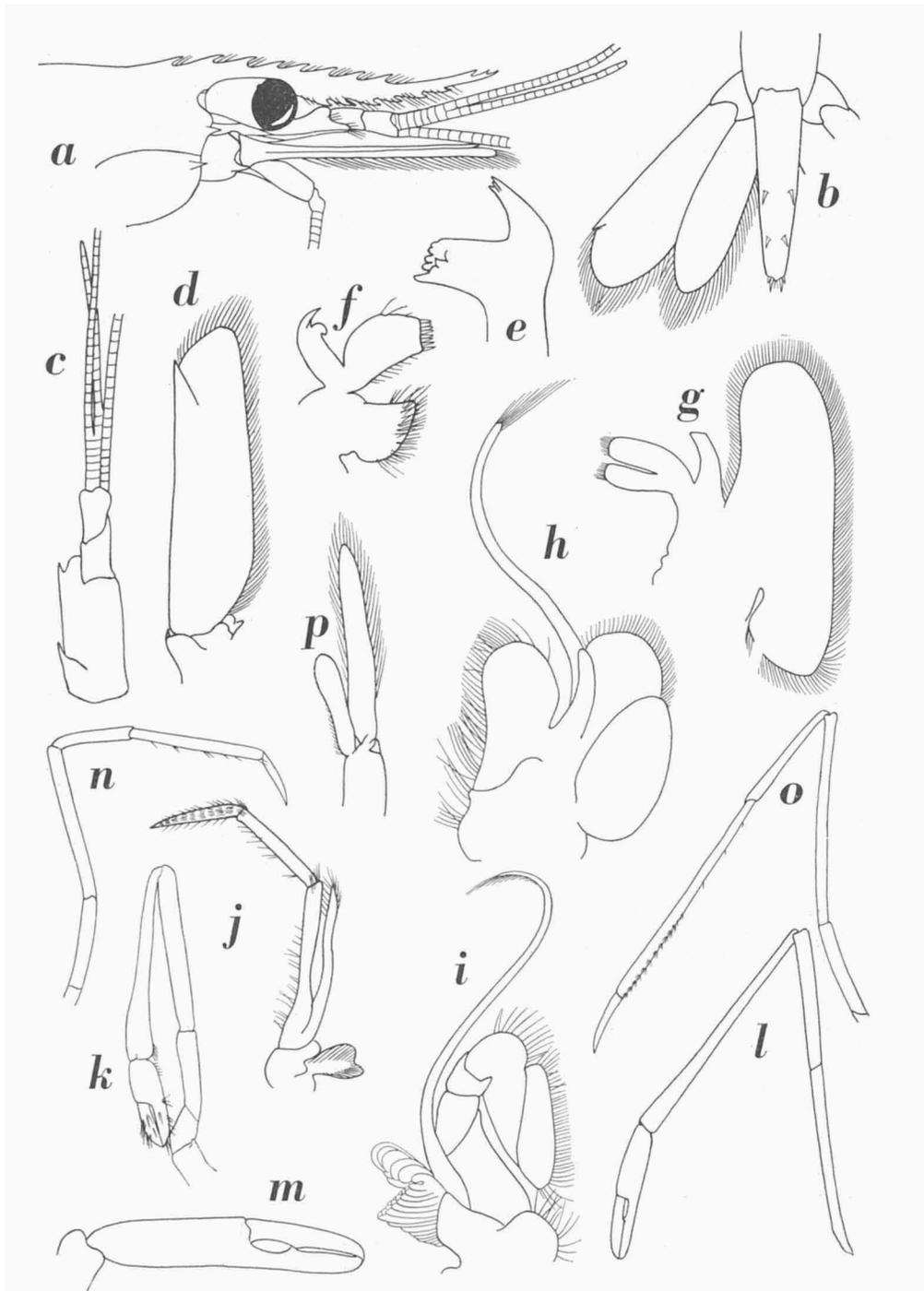


Fig. 9. *Palaemonetes carteri* Gordon. a, anterior part of body in lateral view; b, telson and uropod in dorsal view; c, antennula; d, scaphocerite; e, mandible; f, maxillula; g, maxilla; h, first maxilliped; i, second maxilliped; j, third maxilliped; k, first pereopod; l, second pereopod; m, chela of second pereopod; n, third pereopod; o, fifth pereopod; p, first pleopod of male. Specimen from Suriname. a-d, j-l,  $\times 10$ ; e-i,  $\times 25$ ; m,  $\times 20$ ; n-p,  $\times 6$ . After Holthuis, 1952.

Troelinde Creek near Zanderij, about 40 km S. of Paramaribo; forest creek, water brown, acid, pH 4.5; 14 January 1943; D. C. Geijskes. — 1 specimen.

Zanderij; 3 August 1948; P. Wagenaar Hummelinck no. 409. — 25 specimens (5 ovigerous).

Small forest creek near Zanderij; water brown, acid, shaded; 9 April 1957; L. B. Holthuis no. 1229. — 78 specimens (5 ovigerous).

Open creek near Zanderij airfield; 9 April 1957; L. B. Holthuis no. 1230. — 73 specimens (10 ovigerous).

Small forest creek near Sectie O, on the railroad from Paramaribo into the interior at about 70 km S. of Paramaribo; 10 April 1957; L. B. Holthuis no. 1233. — 5 specimens (1 ovigerous).

Small forest creek near Sectie O, about 70 km S. of Paramaribo on the railroad; water clear, pH 5.4; bottom shingle; 7 June 1947; D. C. Geijskes. — 9 specimens.

Guyana Goud Placer, about 95 km S. of Paramaribo on the railroad; October 1911; W. C. van Heurn. — 20 specimens (2 ovigerous).

Small forest creek near Gros, about 100 km S. of Paramaribo on the railroad; 10 April 1957; L. B. Holthuis no. 1234. — 33 specimens (10 ovigerous).

Small forest creek near Brownsweg, about 115 km S. of Paramaribo on the railroad; creek containing but little, clear water; 10 April 1957; L. B. Holthuis no. 1235. — 39 specimens (6 ovigerous).

Kabel, about 130 km S. of Paramaribo at the end of the railroad; in artificial pool; water fresh, brownish; bottom kaolin-clay; 23 September 1938; D. C. Geijskes. — 6 specimens.

Makambi Creek near Kabel; 24 September 1938; D. C. Geijskes. — 8 specimens.

Makambi Creek near Kabel; 31 August 1955; P. Wagenaar Hummelinck no. 647. — 9 specimens.

Shore of Suriname River near Kabel; 1 September 1955; P. Wagenaar Hummelinck no. 644. — 1 specimen.

Kabel; in ditch; 2 September 1955; P. Wagenaar Hummelinck no. 646. — 58 specimens (1 ovigerous).

Swamp 7.7 km S. of the coast near the Wiawia Bank; water brownish, salinity 0.06 ‰, pH 5.2-5.5; 24 November 1948; 1948-1949 Suriname Expedition no. 3624. — 3 specimens.

Forest pool 7.8 km S. of the coast near the Wiawia Bank; salinity 0.06 ‰, pH 6.6; 24 November 1948; 1948-1949 Suriname Expedition no. 3612. — 12 specimens.

Swamp 9.2 km S. of the coast near the Wiawia Bank; water clear, salinity 0.06 ‰; bottom clay; 28 November 1948; 1948-1949 Suriname Expedition no. 3969. — 73 specimens (3 ovigerous).

Forest pool 12.1 km S. of the coast near the Wiawia Bank; bottom black mouldy mud with dead leaves and branches; 26 November 1948; 1948-1949 Suriname Expedition no. 3826. — 4 specimens.

Pool 12.6 km S. of the coast near the Wiawia Bank; water clear, brown, acid; bottom with many dead leaves and roots; 26 November 1948; 1948-1949 Suriname Expedition no. 3825. — 24 specimens (6 ovigerous).

Swamp 13.3 km S. of the coast near the Wiawia Bank; 27 November 1948; 1948-1949 Suriname Expedition no. 3965. — 37 specimens (4 ovigerous).

Pool in swamp 13.7 km S. of the coast near the Wiawia Bank; 27 November 1948; 1948-1949 Suriname Expedition no. 3966. — 14 specimens (1 ovigerous).

Third Swamp, 19 km N. of Moengotapoe; water clear, brown; 22 October 1948; 1948-1949 Suriname Expedition no. 2298. — 9 specimens.

First Swamp, 17.3 km N. of Moengotapoe; salinity 0.01 ‰, pH 6.7; bottom clay; 24 October 1948; 1948-1949 Suriname Expedition no. 2299. — 1 specimen.

Djai Creek, 8.4 km N. of Moengotapoe; water turbid brown, pH 5.3-5.4; 8 October 1948; 1948-1949 Suriname Expedition nos. 1258, 1262. — 131 specimens.

Wane Creek, 5.3 km N. of Moengotapoe; water brown, acid, salinity 0.015 ‰, pH 5.3; September 1948; 1948-1949 Suriname Expedition no. 856. — more than 1500 specimens.

Small forest creek 0.4 km N. of Moengotapoe; bottom sand with many dead leaves; 21 September 1948; 1948-1949 Suriname Expedition no. 387. — 1 specimen.

Lai Creek, Moengotapoe; water brown, acid, pH 5-5.5; bottom sand with dead leaves; 21 September 1948; 1948-1949 Suriname Expedition no. 386. — 41 specimens (8 ovigerous).

Near the Marowijne River; autumn 1951; E. C. Stoll don. — 2 specimens (1 ovigerous).

Suriname; August 1951; E. C. Stoll don. — 6 specimens.

#### Museum Amsterdam

Zanderij; 12-13 February 1957; J. van der Kamp. — 4 specimens.

#### Museum Berlin

Upper Commewijne River; February 1908; C. Heller. — 2 specimens (1 ovigerous). (There is also a label with this material reading "Paramaribo Niederl. Guyana. C. Heller").

Suriname; J. Michaelis. — 29 specimens (20 ovigerous).

#### Museum Hamburg

Paramaribo; J. Michaelis, received 30 September 1898 and 31 January 1899; 1908 and 1909, C. Heller. — 61 specimens (26 ovigerous).

Side creek of Para River; 10 April 1910; C. Heller. — 12 specimens (11 ovigerous).

Upper Para River; J. Michaelis; received 13 June 1901. — 21 specimens (5 ovigerous).

Description. Holthuis, 1952, p. 218, pl. 52 figs. c-o, pl. 53 figs. a-c.

Remarks. The specimens examined vary in length between 8 and 36 mm. The ovigerous females are 22 to 36 mm long, they were collected in the months of February, March, April, August, September, October, November, and December, and thus appear to be found all through the year.

Colour. In the living specimen the eggs are of a green colour. Often two or three dark lines are visible on the gills. A colour description of Suriname specimens was given by Holthuis (1952).

The Trench Shrimp described and figured by Graham (1955, p. 41, pl. 5 fig. 8) after material from British Guiana, probably is the present species, to which possibly also belongs her Freshwater Shrimp (Graham, 1956, p. 172, fig. 173), though both may represent *Macrobrachium jelskii* (Miers).

Type locality. Creek near Upper Cuyuni River, British Guiana.

Distribution. Venezuela and the three Guianas.

Occurrence in Suriname. *Palaemonetes carteri* is the most common prawn of small streams, ditches, pools and swamps of the coastal region of Suriname. As a rule it may be found in shallow waters among water plants, often in sunny, but also in heavily shaded places. Though it seems to have a slight preference for somewhat acid milieus, it has been found in waters with pH

ranging from 4.5 to 8. It is decidedly a fresh water form, and has been reported from waters with the salinity ranging from 0.01 to 0.09‰. In the last 10 years the species has been repeatedly mentioned from Suriname. Holthuis (1948) reported upon the above mentioned material from Troelinde Creek, Sectie O, and Kabel; the same author (Holthuis, 1950a) mentioned the material collected by the 1948-1949 Suriname Expedition, the localities of which were described more extensively than has been done here, while also the material from Paramaribo, Guyana Goud Placer and Makambi Creek (leg. Geijskes) was reported upon, the locality Saramacca River Basin given in the same publication rests upon a lapsus. In 1952 Holthuis described and figured the species, giving at the same time an enumeration of all the localities whence it was known at that time. Maccagno & Cucchiari (1957) dealt with material from Sta. 856 of the 1948-1949 Suriname Expedition (Wane Creek) which has been presented by the Leiden Museum to the Istituto e Museo di Zoologia of Turin, Italy.

**Macrobrachium amazonicum** (Heller, 1862) (textfig. 10)

*Palaemon Amazonicus* De Man, 1879, p. 166.

*Palaemon Dieperinkii* (De Haan MS) De Man, 1879, p. 167; Sunier, 1925, p. cxv.

*Palaemon lamarrei* Thompson, 1901, p. 19.

*Palaemon amazonicus* Jentink, 1912, p. 13; Sunier, 1925, p. cxv.

*Macrobrachium amazonicum* Holthuis, 1950a, p. 29; Holthuis, 1952, p. 18, pl. 2.

Museum Leiden

Saramacca River near Groningen; September 1911; W. C. van Heurn. — 1 ovigerous female.

"Suriname Rivier" lightvessel; 1953; H. W. Lijding. — 1 ovigerous female.

Suriname River 10 miles above the mouth; 11 February 1954; H. W. Lijding. — 2 specimens (1 ovigerous).

"Geijersvlijt" plantation, just N. of Paramaribo; July 1911; W. C. van Heurn. — 2 specimens.

Swamp behind "Cultuurtuin" (Agricultural Experiment Gardens), Paramaribo; 10 March 1939; H. W. C. Cossee. — 1 specimen.

Saramacca Canal, Paramaribo; 25 November 1957, 27 June 1958; D. C. Geijskes. — 11 specimens (2 ovigerous, from 25 November).

Paramaribo; 1911; W. C. van Heurn. — 13 specimens.

Suriname River near "Peperpot" Plantation, S. of Paramaribo; muddy eastern shore of the river, water brackish; 5 January 1949; 1948-1949 Suriname Expedition no. 6209. — 1 specimen.

Pool near the confluence of the Para and Suriname Rivers, S. of Paramaribo; fresh water; bottom muddy with dead leaves; 31 March 1957; L. P. Holthuis no. 1203. — 27 specimens.

Suriname River near Kabel, about 130 km S. of Paramaribo; 21-28 September 1938; D. C. Geijskes. — 10 specimens.

Mouth of the Marowijne River near Langamankondre; shallow brackish water; sandy bottom; 19 September 1948; 1948-1949 Suriname Expedition no. 282. — 1 specimen.

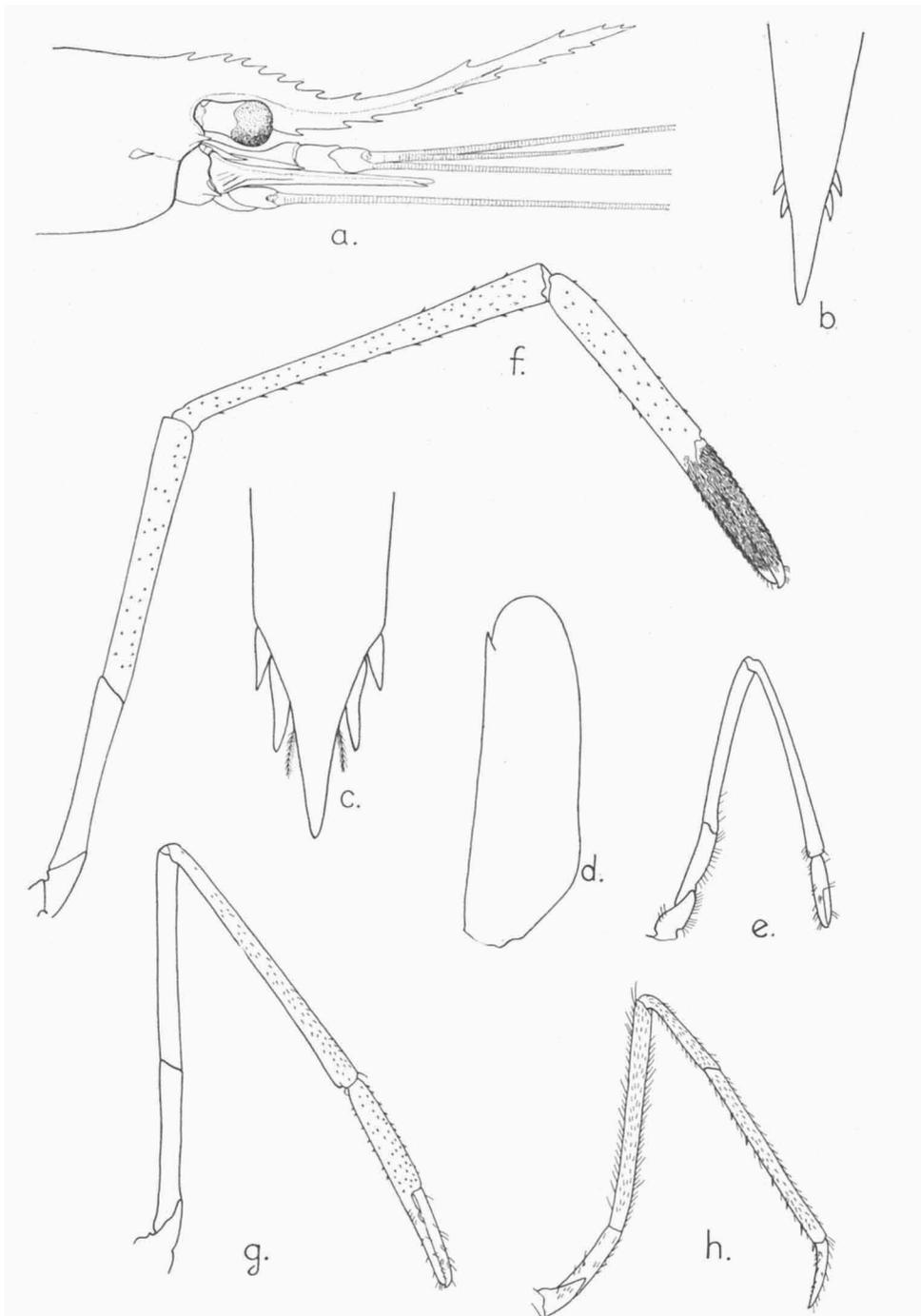


Fig. 10. *Macrobrachium amazonicum* (Heller). a, anterior part of body in lateral view; b, tip of telson of adult specimen; c, tip of telson of juvenile; d, scaphocerite; e, first leg; f, second leg of adult male; g, second leg of female; h, third leg of adult male. Specimens from Suriname. a,  $\times 1.5$ ; b,  $\times 10$ ; c,  $\times 50$ ; d-h,  $\times 2$ . After Holthuis, 1952.

Suriname; 1816-1836; H. H. Dieperink. — 15 specimens (types of *Palaemon dieperinkii* (De Haan MS) De Man).

Suriname; C. F. Kraepelin & H. Holm. — 2 specimens (1 ovigerous).

Suriname; fresh water; 1907; M. D. Horst. — 4 specimens.

Suriname; 1910; D. G. J. Bolten. — 10 specimens.

Saint Laurent, Marowijne River, French Guiana; May 1958; J. Durand. — 2 specimens.

Port Inini, Marowijne River, French Guiana; November 1952; J. Durand. — 1 specimen.

#### Museum Amsterdam

Sommeldijksche Creek, Paramaribo; brackish water; February 1923. — 1 specimen.  
Suriname. — 1 specimen.

#### Museum Berlin

Paramaribo; C. Heller. — 11 specimens.

Marowijne River near Albina; C. Heller. — 5 specimens.

#### Museum Hamburg

Paramaribo; J. Michaelis, received 31 January 1899; 1908 and 1909, C. Heller. — 25 specimens (1 ovigerous).

Description. Holthuis, 1952, p. 18, pl. 2.

Remarks. The specimens examined vary between 12 and 125 mm in length. Ovigerous females were found in the months of February, September, and November.

Colour. The following colour description was made after living specimens from a pool near the confluence of the Para and Suriname Rivers. The body is transparent and gives a general impression of grey. A dark line extends over the distal  $\frac{3}{4}$  of the midrib of the rostrum; another longitudinal dark line is visible on the carapace behind the antennal spine. Along each of the lateral margins of the telson a line of dark colour can be seen. The ophthalmic peduncle is provided with a spot formed by red and yellow chromatophores. The antennular peduncle has its entire inner margin and the outer margin of its basal segment of a dark colour. Also the entire inner flagellum of the antennula is darkly coloured, the outer flagellum being pale. The exopod of the uropod possesses a dark line along its outer margin, while a conspicuous dark spot is present in the distal part of this exopod. Another dark longitudinal line extends just externally of the middle of the uropodal endopod.

Type locality. "Wurde von Natterer im Amazonenstrome gefunden" (Heller, 1862, p. 419). Johann Natterer, who from 1817 to 1835 collected in Brazil for the Vienna Museum, travelled from Rio de Janeiro across the Matto Grosso to the Rio Negro and then followed the Amazon down (cf. Eigenmann, 1917, Mem. Mus. comp. Zoöl. Harvard, vol. 43, pl. 1). The

type locality of the present species therefore is the Amazon River somewhere between Manaos and its mouth.

Distribution. The species is known from various rivers in Venezuela and the three Guianas, from the Amazon basin in Brazil, Bolivia, Peru, and Ecuador, and from the Paraguay River basin. The species was reported from British Guiana by Graham (1955, p. 40, pl. 5 fig. 11) under the name "Small Prawn".

Occurrence in Suriname. In Suriname *Macrobrachium amazonicum* has been found mostly in the larger rivers, in fresh or brackish water. The find of the species near the "Suriname Rivier" lightvessel, provided that the lot is correctly labelled, seems to indicate that it is sometimes washed out into the sea. Previous Suriname records are: Saramacca River near Groningen (Holthuis, 1950a, 1952), Suriname River near Paramaribo and near Kabel (Holthuis, 1950a, 1952), Marowijne River near Langamankondre (Holthuis, 1950a, 1952), Suriname (De Man, 1879; Thompson, 1901; Jentink, 1912; Sunier, 1925; Holthuis, 1950a, 1952). As already pointed out by De Man (1879), Sunier (1925), and Holthuis (1952), the specimen which De Haan (1849, p. 171) reported upon as *Palaemon Lamarrei* from Japan, actually belongs to the present species. It is most likely that it has been incorrectly labelled as to the locality and originally had formed part of Dieperink's Suriname collection.

The 15 specimens listed above as collected by Dieperink in Suriname probably are those mentioned by him in his list of the consignment sent on 1 April 1827 as "Surinaamsche kreeftgarnalen" (see p. 22). The specimens are the types of *Palaemon Dieperinkii* (De Haan MS) De Man, 1879.

### **Macrobrachium jelskii** (Miers, 1877) (textfig. 11)

*Macrobrachium amazonicus* Reyne, 1923, p. 39.

*Macrobrachium jelskii* Holthuis, 1948, p. 1111; Holthuis, 1950a, p. 30; Holthuis, 1950b, p. 15; Holthuis, 1952, p. 26, pl. 4 figs. a-d; Maccagno & Cucchiari, 1957, p. 132, fig. 36.

#### Museum Leiden

Nanni Creek near Dam van Wouw, Nickerie River basin; swamp creek; pH about 5; 12 February 1942; D. C. Geijskes. — 4 juveniles.

In artificial pool along highway 21.6 km E. of Coronie; salinity 0.09 ‰, pH 8; bottom clay; 20 December 1948; 1948-1949 Suriname Expedition no. 4387. — 11 specimens.

"Geijersvlijt" plantation just N. of Paramaribo; July 1911; W. C. van Heurn. — numerous specimens, including ovigerous females.

Saramacca Canal, Paramaribo; 25 November 1957, 27 June and 4 July 1958; D. C. Geijskes. — 40 specimens (1 ovigerous, from 25 November).

Paramaribo; 1911, July 1911, August 1911; W. C. van Heurn. — numerous specimens, including ovigerous females in the lots of 1911 and July 1911.

Coropina Creek near Bersaba, near Republik; fresh water; 9 April 1957; L. B. Holthuis no. 1232. — 2 specimens.

Coropina Creek near Republik; fresh water; 9 April 1957; L. B. Holthuis no. 1231. — 95 specimens (3 ovigerous).

Side creek of Coropina Creek near Vierkinderen bridge, Republik; water pale brown, pH 5.5-6; bottom kaolin clay with rather much vegetable mould; 5 September 1948; 1948-1949 Suriname Expedition no. 79. — 1 specimen.

Upper course of Coropina Creek; 29 October 1953; D. C. Geijskes. — 1 specimen.

Side creek of Warappa Creek, N. of the Commewijne River; in pool; 7 April 1957; L. B. Holthuis no. 1223. — 14 specimens.

Mouth of the Marowijne River near Galibi; in a small creek which empties in the river; water brackish and muddy; 9 November 1948; 1948-1949 Suriname Expedition no. 2511. — 4 specimens.

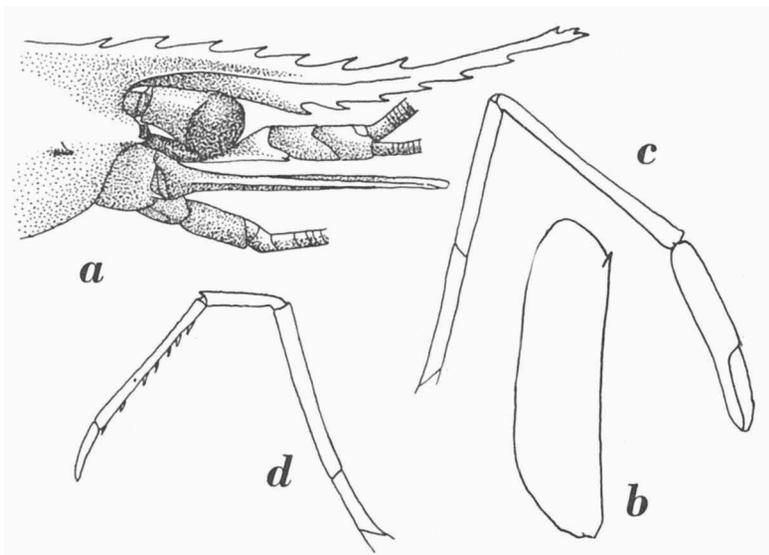


Fig. 11. *Macrobrachium jelskii* (Miers). a, anterior part of body in lateral view; b, scaphocerite; c, second leg of adult male; d, third leg of adult male. Specimen from Suriname. After Holthuis, 1952.

#### Museum Amsterdam

"Pieterszorg" plantation, mouth of the Commewijne River near Paramaribo; February 1923. — 16 specimens (1 ovigerous).

Suriname; 1922 Suriname Expedition to Hendrik Mt.; J. W. Gonggrijp & G. Stahel. — 19 specimens.

#### Museum Berlin

Suriname; J. Michaelis. — 9 specimens.

Suriname; H. B. Möscher. — 13 specimens (12 ovigerous).

#### Museum Hamburg

Coronie; fresh water trench; November 1909; C. Heller. — 6 specimens.

Paramaribo; J. Michaelis, received 30 September 1898 and 31 January 1899; 1908 and 1909, C. Heller. — 6 specimens.

Side creek of Para River; 10 April 1910; C. Heller. — 2 specimens.

Upper Para River; J. Michaelis; received 13 June 1901. — 1 specimen.

Side creek of Upper Commewijne River; November 1908; C. Heller. — 4 specimens.

#### Museum Washington

Plantation ditches, Paramaribo; 1922; A. Reyne. — 32 specimens (13 ovigerous).

Description. Holthuis, 1952, p. 26, pl. 4 figs. a-d.

Remarks. The present specimens are 20 to 53 mm long, the ovigerous females 47 to 52 mm.

Type locality. Oyapock, French Guiana.

Distribution. The species has been reported from Venezuela, Trinidad, Suriname and French Guiana.

Occurrence in Suriname. Though this is essentially a fresh water species, it has also been found in somewhat brackish habitats; that it is not very particular as far as habitats are concerned is furthermore shown by that it is found in clear as well as in muddy, in stagnant as well as in running, in acid as well as in alkaline waters (pH 5.5-8). Ovigerous females have been collected in the months of February, April, July and November.

In the 1922 annual report of the Department of Agriculture, Industry and Trade of Suriname, Reyne (1923, p. 39) mentioned "Macrobrachium amazonicus Heller (= *M. jelskii* Miers = *M. ensiculus* Smith), zoetwater-garnaal (Sarra-sarra), algemeen in de plantagetrenzen; wordt gegeten." (M.a. ... fresh water prawn, native name Sarra-sarra, common in plantation ditches; used for food). Reyne indicated that the identification of this material was made at the U.S. National Museum, Washington, D.C. In 1948 Reyne's material, which originated from Paramaribo, was examined by me in Washington and proved to belong to *M. jelskii*. It has been mentioned by me in previous papers (Holthuis, 1950a, p. 30; 1952, p. 27) before I was aware of Reyne's publication. Reyne thus was the first to report upon Suriname specimens of the present species. The next Suriname record of *M. jelskii* concerned the above mentioned material from Nanni Creek (Holthuis, 1948, 1952), while the specimens from the 1948-1949 Suriname Expedition, those from "Geijersvlijt" plantation, and those from Paramaribo (leg. Van Heurn), all of which are listed in the present paper, have been mentioned before by Holthuis (1950a, 1952). Maccagno & Cucchiari (1957) dealt with material from "Geijersvlijt" plantation obtained by the Turin Museum from the Rijksmuseum van Natuurlijke Historie at Leiden.

**Macrobrachium acanthurus** (Wiegmann, 1836)

*Palaemon* p.p. Bakhuis, 1902, p. 839.

*Palaemon acanthurus* Jentink, 1903, p. 11; Jentink, 1904, p. 6.

*Palaemon (Eupalaemon) acanthurus* De Man, 1912, p. 243.

*Macrobrachium acanthurus* Holthuis, 1950a, p. 35; Holthuis, 1952, p. 45, pl. 8, pl. 9 figs. a, b.

## Museum Leiden

Coppename River; 1901; 1901 Coppename Expedition. — 3 specimens (2 ovigerous).  
Suriname; Koloniaal Museum, Haarlem, don. — 1 specimen.

Description. Holthuis, 1952, p. 45, pl. 8, pl. 9 figs. a, b.

Type locality. Brazil.

Distribution. The species inhabits fresh and brackish waters of the American east coast between Georgia (U.S.A.) and southern Brazil, it is rather common in the West Indies.

Occurrence in Suriname. This species seems to be comparatively rare in Suriname. The Leiden Museum possesses only the above 4 specimens, while no other Suriname material is known to me. The first record of this species from Suriname was the one by Jentink (1903), who mentioned the above listed specimen from the Haarlem Colonial Museum. The same specimen was mentioned again by Jentink (1904) and De Man (1912). All of the material listed above was dealt with by me in 1950a and 1952.

The "3 *Palaemon*" collected by the Coppename Expedition and mentioned by Bakhuis (1902, p. 839) in his narrative of this expedition, probably stand for the three lots of *Macrobrachium* brought home by that expedition, one of these lots being formed by the above three specimens of *M. acanthurus*, the other two consisting of *M. olfersii* (Wiegmann).

**Macrobrachium surinamicum** Holthuis, 1948 (textfig. 12)

*Macrobrachium surinamicum* Holthuis, 1948, p. 1112; Holthuis, 1950a, p. 35; Holthuis, 1950b, p. 18; Holthuis, 1952, p. 57, pl. 12.

## Museum Leiden

Mouth of the Suriname River; 5 July 1944; D. C. Geijskes. — 6 specimens (paratypes).

"Geijersvlijt" plantation N. of Paramaribo; July 1911; W. C. van Heurn. — 94 specimens (60 ovigerous, 1 with Bopyrid in branchial chamber) (holo- and paratypes).

Saramacca Canal, Paramaribo; 1 October 1953, 27 June and 4 July 1958; D. C. Geijskes. — 148 specimens (16 and 9 ovigerous females from 27 June and 4 July respectively; 1 specimen with a Bopyrid and one with a Cymothoid parasite).

Suriname River near Paramaribo; 23 March 1939; H. W. C. Cossee. — 1 specimen (paratype).

Paramaribo; July and October 1911; W. C. van Heurn. — 121 specimens (70 ovigerous, 1 with Bopyrid in branchial chamber) (paratypes).

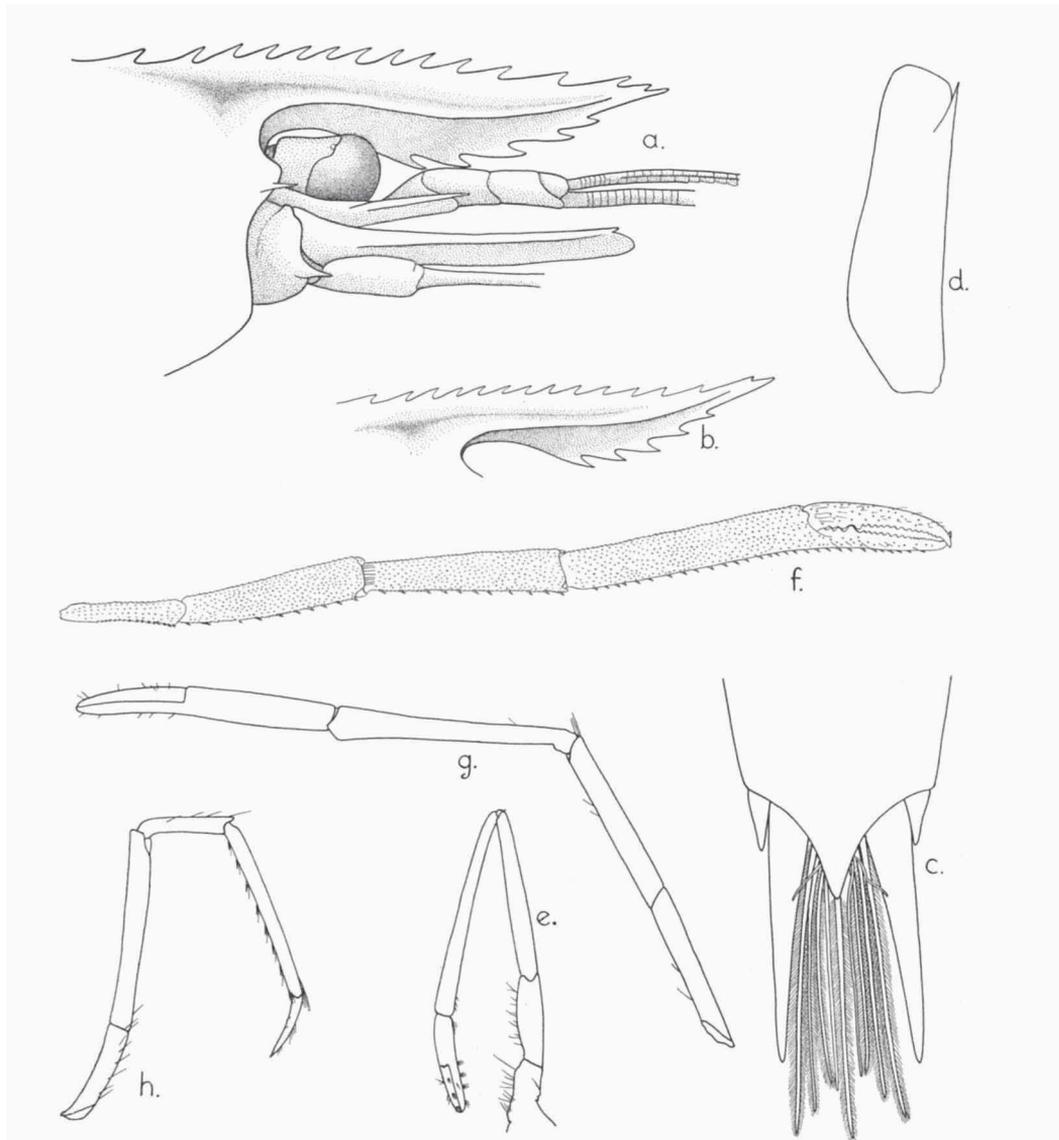


Fig. 12. *Macrobrachium surinamicum* Holthuis. a, anterior part of body of male in lateral view; b, rostrum of ovigerous female in lateral view; c, tip of telson in dorsal view; d, scaphocerite; e, first pereiopod; f, second pereiopod of adult male; g, second pereiopod of female; h, third pereiopod. Specimens from plantation "Geijersvlijt", Paramaribo. a, b, d, e, g, h,  $\times 5.5$ ; c,  $\times 40$ ; f,  $\times 3$ . After Holthuis, 1952.

Pool near the confluence of the Para and Suriname Rivers, S. of Paramaribo; fresh water; bottom muddy with dead leaves; 31 March 1957; L. B. Holthuis no. 1203. — 3 juveniles.

Suriname; fresh water; 1907; M. D. Horst. — 3 specimens (paratypes).

Suriname; 6 July 1944; D. C. Geijskes. — 6 specimens (3 ovigerous) (paratypes).

#### Museum Berlin

Paramaribo; C. Heller. — 5 specimens (2 ovigerous).

#### Museum Hamburg

Paramaribo; J. Michaelis, received 31 January 1899; 1908 and 1909, C. Heller. — 5 specimens (2 ovigerous).

Description. Holthuis, 1952, p. 57, pl. 12.

Remarks. The specimens are 17 to 55 mm long. Ovigerous females are 27 to 45 mm, and were found in the months of June, July, and October. The largest specimen, a male of 55 mm, is the holotype.

Type locality. "Geijersvlijt" plantation N. of Paramaribo.

Distribution. The species has been reported from Colombia, British Guiana, and Suriname, while there is also a doubtful record from Venezuela. The species lives in fresh and also in somewhat brackish waters.

Occurrence in Suriname. Previous Suriname records are: mouth of the Suriname River (Holthuis, 1948, 1952), "Geijersvlijt" plantation (Holthuis, 1948, 1952), Suriname River near Paramaribo (Holthuis, 1950a, 1952), Suriname (Holthuis, 1948, 1950a, 1950b, 1952).

### **Macrobrachium brasiliense** (Heller, 1862)

*Macrobrachium brasiliense* Holthuis, 1948, p. 1111; Holthuis, 1950a, p. 30; Holthuis, 1952, p. 79, pl. 19.

#### Museum Leiden

Well in the Emma Range, basin of the Rechter Coppename River; altitude 150 m; water clear, pH 6; 30 October 1943; D. C. Geijskes. — 1 specimen.

Bigidjampo, Lolobroki, and Mispel Creeks, near the railway at 121 km S. of Paramaribo; 30 November 1949; C. Bleys. — 34 specimens.

Waktibasoe Creek near goldmining camp near Browns Mt.; 10 August 1958; D. C. Geijskes. — 1 specimen.

In mountain creek near the summit of Browns Mt.; altitude 400 m; water clear, pH 6.2; 16 September 1938; D. C. Geijskes. — 8 specimens.

Creek near Browns Mt.; below the first waterfall; 17 September 1938; D. C. Geijskes. — 1 juvenile.

Lower course of creek near Browns Mt., near Suriname River; 18 September 1938; D. C. Geijskes. — 1 juvenile.

Makambi Creek near Kabel; 27 September 1938; D. C. Geijskes. — 9 juveniles.

Makambi Creek near Kabel; 31 August 1955; P. Wagenaar Hummelinck no. 647. — 3 juveniles.

Suriname River near Kabel, in pool; 1 September 1955; P. Wagenaar Hummelinck no. 644A. — 2 juveniles.

Mapane Creek in Commewijne basin; forest creek; 10 December 1953; D. C. Geijskes. — 1 juvenile.

Small forest creek 0.4 km N. of Moengotapoe; water acid, brown; bottom sand with many dead leaves; 21 September 1948; 1948-1949 Suriname Expedition no. 387. — 3 specimens.

Nassau Range, 2 km W. of Marowijne River at 4° 47' N; water fast flowing, clear, pH 6.7; bottom shingle and sand; 22 and 25 February 1949; 1948-1949 Suriname Expedition nos. 7392 and 7646. — 56 specimens.

Bleeders Creek, Nassau Range at 7 km W. of Marowijne River at 4° 47' N; between branches and leaves among stones at the foot of a large fall; water fast flowing, clear; 7 March 1949; 1948-1949 Suriname Expedition no. 8327. — 1 specimen.

Small creek in Nassau Range, 3.6 km W. of Marowijne River at 4° 47' N; fast flowing clear water; 11 March 1949; 1948-1949 Suriname Expedition no. 8697. — 25 specimens.

Shaded mountain creek in Nassau Range, 11.2 km W. of Marowijne River at 4° 47' N; water clear, pH 6.5; bottom sand and shingle; 15 March 1949; 1948-1949 Suriname Expedition no. 9008. — 147 specimens (1 ovigerous).

Apisiké, upper Paru River, Brazil, just S. of the Suriname border, Grens Range; 15 to 20 April 1952; 1952 Medical Expedition no. 1265. — 1 specimen.

Apisiké; forest creek; 20 April 1952; 1952 Medical Expedition no. 1267. — 2 specimens.

Saut Patawa, Mana River, French Guiana; October 1957; J. Durand. — 10 specimens.

Description. Holthuis, 1952, p. 79, pl. 19.

Remarks. The identity of the above mentioned juveniles (length 10 to 35 mm) is not fully certain, since it is very hard to distinguish them from juveniles of related species.

Type locality. "In einem Bache zu Camaroes in Brasilien" (Heller, 1862, p. 419). As has already been pointed out by previous authors the word "Camaroes" probably is not a locality but the native (Portuguese) name for prawns.

Distribution. E. Colombia (Orinoco basin), British Guiana, Suriname, the Amazon basin (N.E. Peru, E. Ecuador, W. Brazil), Matto Grosso.

Occurrence in Suriname. The species seems to prefer rather fast flowing small mountain streams; most specimens have been found in the anterior mountain range and farther into the interior of Suriname. The specimens from near Moengotapoe show that the species may also penetrate into the coastal region. Previous Suriname records are: Right Coppename River basin in Emma Range (Holthuis, 1948, 1952), near Browns Mt. (Holthuis, 1948, 1952), Bigidjomp, Lolobroki, and Mispel Creeks (Holthuis, 1950a; 1952), near Moengotapoe (Holthuis, 1950a, 1952), Nassau Range (Holthuis, 1950a, 1952). All this material is treated in the present paper.

### **Macrobrachium olfersii** (Wiegmann, 1836)

*Palaemon* p.p. Bakhuis, 1902, p. 839.

"een vliegende garnalensoort" Geijskes, 1942, p. 121; Geijskes, 1957, p. 287.

*Macrobrachium? olfersii* Holthuis, 1948, p. 1112; Holthuis, 1950a, p. 35.

*Macrobrachium olfersi* Holthuis, 1952, p. 95, pl. 24, pl. 25 figs. a, b.

## Museum Leiden

Raleigh Falls, Coppename River; 23 August 1901; 1901 Coppename Expedition. — 2 specimens.

Raleigh Falls; among grass-like plants at the foot of the falls; 22 August 1957; D. C. Geijskes. — 26 specimens (1 ovigerous).

Coppename River S. of the Raleigh Falls; September 1901; 1901 Coppename Expedition. — 1 specimen.

Fall near Pretibroekoe, Coppename River; 28 July 1943; D. C. Geijskes. — 1 juvenile.

Zand Creek, Wilhelmina Range; water clear, pH 6.1; bottom sandy with some rocks; 18 and 19 August, and 2 September 1943; D. C. Geijskes. — 5 specimens.

Jandé Creek near Brokopondo on Suriname River; in waterfall; 21 July 1953; D. C. Geijskes. — 1 ovigerous female.

Rapids in the Suriname River just N. of Kabel; among rocks under Podostemonaceae; 10 April 1957; L. B. Holthuis no. 1236. — 18 specimens.

Suriname River near Kabel; 21-28 September 1938; D. C. Geijskes. — 20 specimens (4 ovigerous, 1 with Bopyrid in branchial chamber).

Suriname River near Kabel; in falls; 21 September 1938; D. C. Geijskes. — 1 juvenile.

Armina Falls, Marowijne River; 9 February 1949; 1948-1949 Suriname Expedition, no. 6480. — 6 juveniles.

Bonnidoro Island, Marowijne River; 20 October 1952; D. C. Geijskes. — 4 specimens.

Poeloegoedoe Falls, Marowijne River; 31 August 1939; D. C. Geijskes. — 2 specimens.

Poeloegoedoe Falls; among Podostemonaceae of the genus *Oenone*; 20 August 1953; D. C. Geijskes. — 1 specimen.

Description. Holthuis, 1952, p. 95, pl. 24, pl. 25 figs. a, b.

Remarks. The above material does not contain any fully developed male. The largest male specimen examined is 44 mm long; it lacks the large cheliped, while the smaller has the fingers already distinctly gaping, the gap being filled with long stiff hairs.

Type locality. Brazilian coast.

Distribution. Florida (probably introduced), and the continent of Central and S. America from Mexico to southern Brazil.

Occurrence in Suriname. In Suriname the species is quite frequent in rapids and falls where it lives in the shallow rocky parts among Podostemonaceae and other plants. Previous Suriname records are: Wilhelmina Range (Holthuis, 1948, 1952), Poeloegoedoe Falls (Geijskes, 1942, 1957; Holthuis, 1948, 1952). With "3 Palaemon" Bakhuis (1902) evidently meant the three lots of *Macrobrachium* collected by the 1901 Coppename Expedition which now are preserved in the collection of the Leiden Museum. One of these lots contains *M. acanthurus* (Wiegmann), the other two are the lots of *M. olfersii* mentioned above: Geijskes's (1942, 1957) record of a "vlugge garnalensoort" (agile species of shrimp) is based on the specimens which were collected by him on 31 August 1939 at the Poeloegoedoe Falls, and which now form part of the collection of the Leiden Museum.

**Macrobrachium carcinus** (Linnaeus, 1758) (textfig. 13)

- Squilla*, *Crangon*, *Americana*, *major* Seba, 1761, p. 54, pl. 21 fig. 4.  
*Astacus major* Fermin, 1765, p. 74; Fermin, 1769, vol. 2, p. 274; Fermin, 1770, vol. 2, p. 247; Teenstra, 1835, p. 442.  
 "Rivier-kreeften" Hartsinck, 1770, p. 118.  
 "River lobsters called sarasara" Stedman, 1796, vol. 1, p. 391; Stedman, 1813, p. 406.  
 "écrevisses de rivière" Stedman, 1798, vol. 2, p. 103.  
 "Rivier-kreeften, welke zij sarasara noemen" Stedman, 1799, vol. 2, p. 173.  
 "Ecrevisse" Benoit, 1839, p. 56.  
*Palaemon jamaicensis* Semper, 1869, pp. 585, 586; De Man, 1912, p. 234; Tesch, 1914a, p. 250.  
*Palaemon* Kappler, 1881, p. 143.  
*Astacus* Kappler, 1887, p. 200.  
*Palaemon (Macroterochair) jamaicensis* De Man, 1925, p. 51, fig. 13.  
*Macrobrachium carcinus* Holthuis, 1950a, p. 31; Holthuis, 1952, p. 114, pl. 30, pl. 31 figs. a-c.  
*Macrobrachium carinus* Geijskes, 1954, p. 69.

## Museum Leiden

- Suriname River near Marinetrapp, Paramaribo; between the stones of a stone facing of the riverside; 3 June 1949; 1948-1949 Suriname Expedition no. 9726. — 1 specimen.  
 Suriname River near "Groot Chatillon" plantation, south of Paramaribo; 7 October 1952; C. F. A. Bruijning. — 1 specimen.  
 Suriname River near Kabel; under rocks in a shallow part of the river; 10 April 1957; L. B. Holthuis no. 1236. — 1 specimen.  
 Suriname River near Gansee; October 1951; J. H. C. B. Heyde. — 1 specimen.  
 Marowijne River near Langatabbetje; found in the stomach of a snake; 19 February 1952; D. C. Geijskes. — 1 specimen.  
 Marowijne River near Bonnidoro Island; 20 October 1952; D. C. Geijskes. — 1 specimen.  
 Suriname; 1910; D. G. J. Bolten. — 11 specimens.  
 Suriname. — 6 specimens.  
 Saint Laurent, Marowijne River, French Guiana; May 1958; J. Durand. — 1 specimen.

## Museum Hamburg

- Paramaribo; 1908 and 1909; C. Heller. — 3 specimens (1 ovigerous).  
 Description. Holthuis, 1952, p. 114, pl. 30, pl. 31 figs. a-c.  
 Vernacular name. The Suriname name of the present species is "stone sara-sara" (= rock prawn).  
 Remarks. The examined specimens range in length from 65 to 175 mm. The ovigerous female is 175 mm long.  
 Type locality. "In Americae fluviis" (Linnaeus, 1758, p. 631). Restricted to Jamaica by Holthuis (1952).  
 Distribution. Eastern America from Florida to southern Brazil, and the West Indies. Fresh water.  
 Occurrence in Suriname. In Suriname *Macrobrachium carcinus* is mainly found in the larger rivers among rocks and stones. Because of the large

size (up to 233 mm) which can be attained by this species, and because of its value as food, it is the best known of the fresh water prawns of Suriname. There can be little doubt that the old Suriname records of river-lobsters or crayfish pertain to this species, the other fresh water prawns as a rule being too small to be of much culinary interest. The oldest record of the present species from Suriname is that by Seba (1761) who published an excellent figure and a short description. Seba stated "Je l'ai reçue de Surinam" without giving a more precise locality indication. Fermin (1765, p. 74) gave a short diagnosis of his *Astacus major*: "Cette espèce d'Ecrévisse de riviere, differe considérablement avec celles d'Europe, en ce qu'elle est deux fois plus grosse & qu'elle a les pattes d'une autre figure & trois fois plus longues que les nôtres. Elles sont très-excellentes. Trois de ces Ecrévisses suffisent pour la refection d'une personne." In his later book (1769, vol. 2, p. 274) this description was extended as follows: "On trouve suffisamment d'Ecrévisses dans les rivieres, & dans les criques de la Colonie; & elles ne different de celles d'Europe que par leurs mordants, qui sont plus longs, plus affilés, & plus égaux, dans toute leur longueur; mais qui se serrent & ne coupent pas moins pour cela. Elles sont, en outre, une fois, & je pourrois même dire deux fois, plus grosses que les nôtres: leurs pattes sont aussi plus longues, mais plus étroites. Elles sont fort délicates; & trois ou quatre suffisent pour le souper d'une personne, tant elles sont nourissantes." As already shown on p. 8 of the present paper, the first line of this text (from "On trouve" till "ne coupent pas moins pour cela") is practically literally copied from Labat (1724, vol. 1 pt. 1, p. 105). There can be little doubt that Fermin actually meant to describe the Suriname *Macrobrachium carcinus*. The name *Astacus major*, which Fermin evidently borrowed from Barrère (1741, p. 183) has no nomenclatural status, Fermin's book being non-binominal, while that of Barrère is prelinnean.

Hartsinck (1770, p. 118) also dealt with the present species: "Aan Kreeften is hier ook geen gebrek: zy vallen wel tweemaal zo groot als de Europische, en hebben de Pooten van eene andere gedaante en driemaal langer als de onze. Men vindt 'er ook Rivier-Kreeften als hier te Land, welke zich onder de Takken der Mangrove Boomen onthouden" (There is no scarcity of crayfish here: they are twice as big as the European and have the legs differently shaped, being three times as long as ours. One finds also river-crayfish like in Holland, these are found under the branches of mangrove trees). Hartsinck's account of the crayfish is clearly based on Fermin's (1765, p. 74) "ecrévisse" and thus is *Macrobrachium carcinus*. I do not know what Hartsinck meant with his river-crayfish, his account of these animals perhaps is inspired on Herlein's (1718, p. 200) "Kreeften"

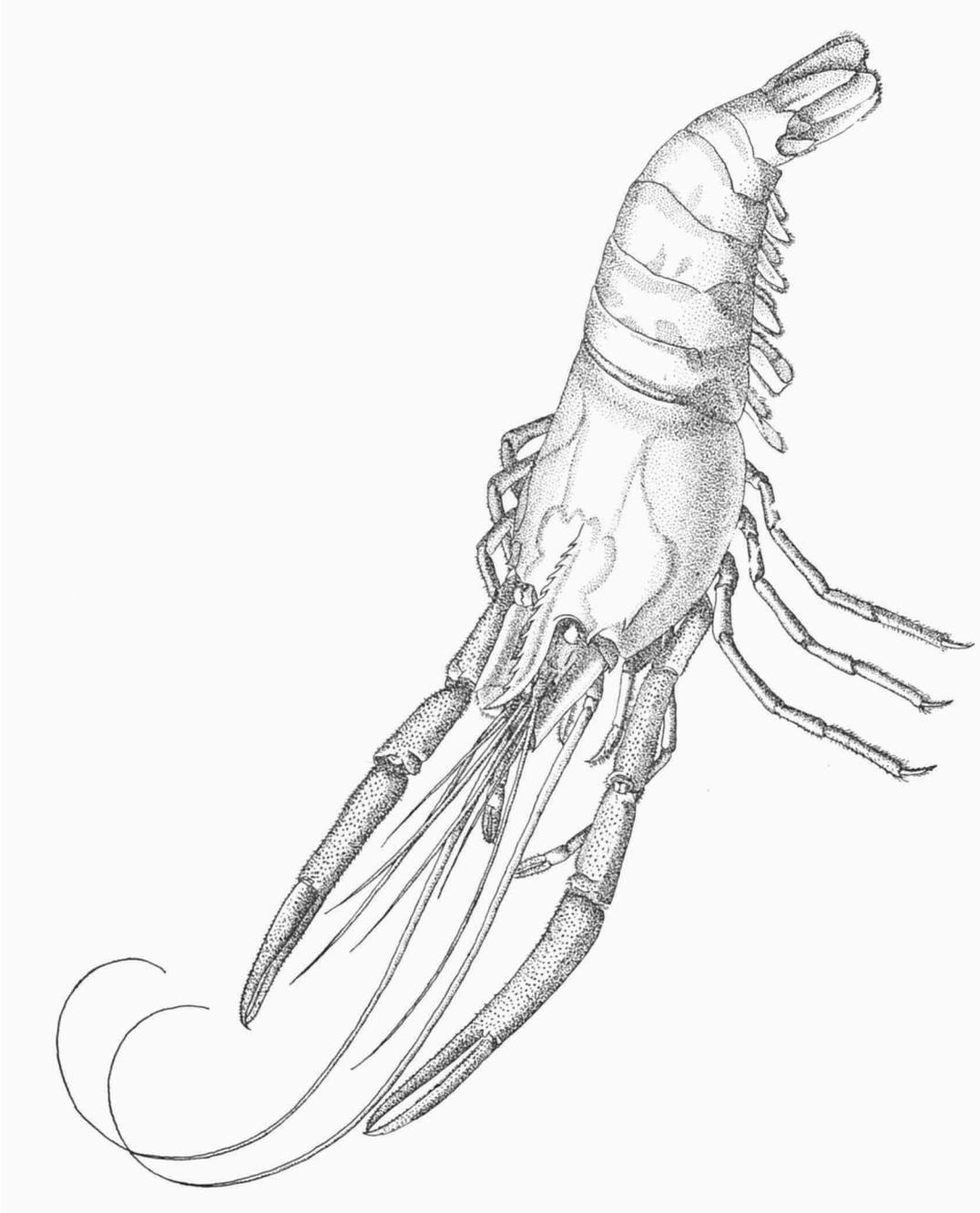


Fig. 13. *Macrobrachium carcinus* (L.). Specimen from Suriname. After Seba, 1761.

which "houden haar onder de struiken van de Bomen aan den oever van de zee" (see p. 6 above) and with which actually Antillean crabs are meant. Stedman (1796) did not provide any description of his "river lobsters called *sarasara*, which are here in great abundance", he only remarked that they are eaten by the Indians. Teenstra's (1835, p. 442) *Astacus major* clearly belongs here. He made the following remarks about these animals: "*Kreeften (Astacus major)* vindt men hier in alle rivieren; hebbende ongemeen lange, dunne scharen en pooten. Over het algemeen zijn de Surinaamsche kreeften iets grooter, dan de rivierkreeften in *Europa*, en voedzaam, maar niet gezond. Zij houden zich veel in brak water op." (Crayfish is found here in all rivers; they have unusually long and slender chelae and legs. As a rule the Suriname crayfish is somewhat bigger than the European; they are nourishing, but not wholesome. They are frequently found in brackish water). Benoit (1839) does not provide much information on the species: "Les écrevisses sont très-abondantes dans les criques et dans les rivières de Surinam. Elles sont plus grosses que les nôtres, et la chair en est délicieuse". Kappler (1881) stated: "In den Flüssen findet man in Felsenlöchern und hohlen Bäumen einen sehr wohlschmeckenden Krebs, Palaesmon(?). Er ist grösser als der Edelkreb, manchmal über einen Fuss lang, mit langen dünnen walzenförmigen Scheeren; schwärzlich von Farbe wird er durch das Kochen hochroth". In his 1887 book Kappler indicated this species as *Astacus* and stated it to occur in the mouth of the Marowijne River, lacking in several other rivers; here Kappler gave the length of the chelipeds as 12 cm. Geijskes (1954, p. 69) remarked of this species: "Een twee decimeter grote garnalensoort die in de rivier tussen de stenen leeft, wordt gegeten. Men kapt de dieren 's nachts bij de lantaarn. Het is een bijkomstige lekkernij, die in het dieet van de Bosnegers echter geen rol van betekenis speelt." (A species of prawn, 20 cm long, which lives in the river among stones, is often eaten. They are caught at night by killing them with a chopping knife at the light of a lantern. It is an incidental delicacy for the bush negroes and does not play any significant rôle in their diet". The specimens from Suriname mentioned by De Man (1912, 1925), Tesch (1914a), and Holthuis (1950a, 1952) all are preserved in the Rijksmuseum van Natuurlijke Historie. The Suriname records of the present species are: Suriname River near Paramaribo (Holthuis, 1950a, 1952), Suriname River (Tesch, 1914a), Marowijne River (Kappler, 1887; Geijskes, 1954), Suriname (Seba, 1761; Fermin, 1765, 1769, 1770; Hartsinck, 1770; Stedman, 1796, 1798, 1799; Teenstra, 1835; Benoit, 1839; Semper, 1869; Kappler, 1881; De Man, 1912, 1925; Holthuis, 1950a, 1952).

## Subfamily Euryrhynchinae

**Euryrhynchus wrzesniowskii** Miers, 1877 (textfig. 14)

*Euryrhynchus wrzesniowskii* Holthuis, 1948, p. 1111; Holthuis, 1950a, p. 28; Holthuis, 1951, p. 5, pl. 1, pl. 2 figs. a-f.

## Museum Leiden

Coropina Creek near Republik; fresh water; 9 April 1957; L. B. Holthuis no. 1231. — 4 specimens.

Troelinde Creek near Zanderij; forest creek in savanna region; water brownish, acid, pH 4.5; 14 January 1943; D. C. Geijskes. — 7 specimens.

Zanderij; 3 August 1948; P. Wagenaar Hummelinck no. 409. — 9 specimens.

Zanderij; in shady savanna creeks; 30 October 1949; D. C. Geijskes. — 10 specimens (1 ovigerous).

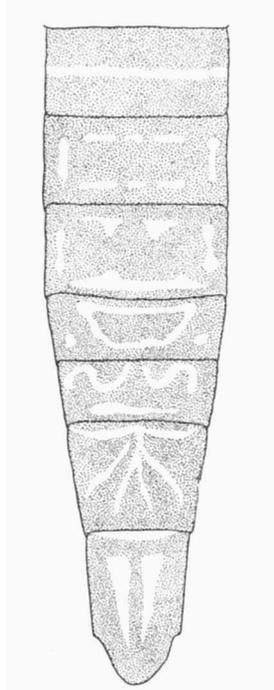


Fig. 14. *Euryrhynchus wrzesniowskii* Miers. Colour pattern of abdomen.

Zanderij; shady forest creek; water brown, acid; 9 April 1957; L. B. Holthuis no. 1229. — 67 specimens (10 ovigerous).

Sectie O on railroad about 70 km S. of Paramaribo; forest creek; 10 April 1957; L. B. Holthuis no. 1233. — 2 specimens (1 ovigerous).

Sectie O on railroad about 70 km S. of Paramaribo; small forest creek; water clear, pH 5.4; bottom shingle; 6 February 1942 and 7 June 1944; D. C. Geijskes. — 8 specimens.

Kabel on Suriname River; in ditch; 2 September 1955; P. Wagenaar Hummelinck no. 646. — 1 specimen.

Swamp 9.2 km S. of the coast near the Wiawia Bank; water clear, salinity 0.06‰; bottom clay; 28 November 1948; 1948-1949 Suriname Expedition no. 3969. — 2 specimens.

Pool 12.6 km S. of the coast near the Wiawia Bank; water clear, brown, acid; bottom with many dead leaves and roots; 26 November 1948; 1948-1949 Suriname Expedition no. 3825. — 6 specimens.

Swamp 13.3 km S. of the coast near the Wiawia Bank; 27 November 1948; 1948-1949 Suriname Expedition no. 3965. — 4 specimens.

Pool in swamp 13.7 km S. of the coast near the Wiawia Bank; 27 November 1948; 1948-1949 Suriname Expedition no. 3966. — 33 specimens (4 ovigerous).

Third Swamp, 19 km N. of Moengotapoe; water clear, brown; 22 October 1948; 1948-1949 Suriname Expedition no. 2298. — 1 specimen.

Djai Creek, 8.4 km N. of Moengotapoe; water turbid, brown, pH 5.3-5.4; 8 October 1948; 1948-1949 Suriname Expedition no. 1262. — 2 specimens.

Small forest creek 0.4 km N. of Moengotapoe; bottom sand with many dead leaves; 21 September 1948; 1948-1949 Suriname Expedition no. 387. — 1 specimen.

Lai Creek, Moengotapoe; water brown, acid, pH 5-5.5; bottom sand with dead leaves; 21 September 1948; 1948-1949 Suriname Expedition no. 386. — 9 specimens.

Neighbourhood of Drietabbetje on the Tapanahoni River; 7 May 1954; D. C. Geijskes. — 14 specimens (6 ovigerous).

#### Museum Hamburg

Para district; fresh water; 10 March 1909; C. Heller. — 64 specimens (5 ovigerous).

Forest creek near the Upper Suriname River; on decaying wood in shaded forest creek; 20 January 1909; C. Heller. — 3 specimens.

Description. Holthuis, 1951, p. 5, pl. 2 figs. a-f.

Remarks. The specimens examined range from 7 to 17 mm in length. The ovigerous females are 11 to 17 mm long; they were collected in the months of April, May, October, and November.

Colour. The following colour description was made after living specimens from Zanderij (Holthuis no. 1229). The body is of a greenish blue colour. Some red chromatophores are scattered among the blue, but as a rule they are hardly noticeable. On the carapace the colour is somewhat mottled, being darker in some places than in others. On the abdomen the greenish blue colour is interrupted by irregular uncoloured bands that are arranged in such a way that they form a pattern which shows a superficial resemblance to the pattern of grooves found on the abdomen of *Nephrops norvegicus* (L.) (see textfig. 14). The first abdominal somite shows a transverse uncoloured band in the middle. On the second and third somites the uncoloured lines form a quadrangle; the lines themselves are interrupted in several places. In the fourth somite the lines adopt the shape of a kind of trapezium which has the longest side parallel to the anterior margin of the somite. In the fifth somite there are two transverse uncoloured bands: a straight band along the posterior margin and a strongly sinuous one along the anterior margin. The sixth somite shows six uncoloured lines which radiate from near the middle of the anterior margin of the somite, spreading out laterally

and posteriorly. The pleurae are uncoloured. The tail fan is very pale greyish blue with distinct red chromatophores. The telson shows two narrow longitudinal uncoloured triangles, one at each side of the median line, while also the basal part of the telson is uncoloured. The antennular peduncle shows blue lines along the anterior and inner margins of the segments; here too red chromatophores are visible. The flagella of both antennula and antenna are pale greyish blue. The scaphocerite and the antennal peduncle, as well as the chelipeds are pale greyish green, while the scaphocerite and the antennal peduncle may show a bluish colour. The last three pairs of pereopods are colourless. The oral parts and the bases of the legs are pale blue. The lines separating the abdominal sternites are blue. The protopod of the pleopods is bluish, the exo- and endopods are colourless.

Type locality. Cayenne, French Guiana; in a well.

Distribution. Until now the species has been reported from British, Dutch and French Guiana only.

Occurrence in Suriname. *Euryrhynchus* inhabits shallow forest creeks and pools, in which the bottom is covered with a thick layer of dead leaves. The animals as a rule live in heavily shaded places where the water is fresh and acid (pH 4.5 to 5.5), and often of a brownish colour. The species has been found only in the coastal area from the foot hills of the anterior mountain range to about 9 km from the sea shore. It was first recorded from Suriname in 1948, when the present author reported upon the above listed material from Troelinde Creek and Sectie O. Later (Holthuis, 1950a) I dealt with the material of the 1948-1949 Suriname Expedition and with the specimens from Zanderij (October 1949, leg. Geijskes); in the cited publication the localities of the 1948-1949 Expedition have been more extensively described than in the present paper. In 1951 I provided a description and figures of the species, while the specimens reported upon in 1948 and 1950a were again listed.

#### Family Alpheidae

#### **Alpheus heterochaelis** Say, 1818 (pl. III fig. 1)

#### Museum Leiden

Eastern shore of the mouth of the Suriname River near Braamspunt; in soft mud which is exposed at low tide; 5 April 1957; L. B. Holthuis no. 1219. — 1 male and 1 ovigerous female.

Suriname River, 10 miles above its mouth; 11 February 1954; H. W. Lijding. — 1 ovigerous female.

Description. Schmitt, 1935, p. 144, fig. 16 (as *Crangon h.*); Verrill, 1922, p. 76, pl. 22 figs. 1, 2, 4, pl. 24 fig. 7, pl. 30.

Remarks. The specimens are 36 to 46 mm long. The ovigerous females measure 42 and 46 mm. They agree with the descriptions given of this species. In the male the dactylus of the smaller first chela is distinctly *Balaeniceps*-shaped. This same specimen carries a Bopyrid parasite in the left branchial chamber.

Type localities. Coast of South Carolina and Amelia Island, Florida. Here restricted to Amelia Island, Nassau Co., N.E. Florida, U.S.A.

Distribution. Bermuda and Virginia (U.S.A.) to S. Brazil and the West Indies. The species had not been reported before from Suriname. It is evidently the same species as that which Graham (1955, p. 42, pl. 5 fig. 14) reported from British Guiana as "Demerara Lobster".

### ***Alpheus intrinsecus* Bate, 1888**

#### Coquette Investigations

Near the lightvessel "Suriname Rivier", off the mouth of the Suriname River; depth 7 m; 3 May 1957; fifth voyage. — 1 male. (L)

Station 360, off the mouth of the Suriname River, 6° 19'—6° 20' N 55° 15'—55° 14' W; bottom mud and shells; depth 26 m; 22 July 1957. — 1 ovigerous female. (W)

Description. Bate, 1888, p. 557, pl. 100 fig. 1.

Remarks. The male specimen is 33 mm long, the ovigerous female 21 mm. They agree perfectly with the descriptions of this species. The smaller chela of the male has the dactylus *Balaeniceps*-shaped.

Type locality. Off Bahia, Brazil; 7 to 20 fathoms.

Distribution. Brazil (Bahia, São Sebastião), and West Africa (Rio de Oro to Belgian Congo and São Thomé). The species is now reported for the first time from Suriname.

### ***Synalpheus apioceros* Coutière, 1909**

#### Coquette Investigations

About 20 miles off the coast of Suriname between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 juvenile. (L)

Description. Coutière, 1909, p. 27, figs. 9-13.

Remarks. The specimen, length 10 mm, is evidently juvenile, and for that reason it cannot be assigned to any of the subspecies recognized by Coutière (1909). It differs from Coutière's description of the typical *S. apioceros* in having the final tooth of the scaphocerite shorter, reaching only slightly beyond the antennular peduncle. Furthermore the last segment of the antennal peduncle (carpocerite) is more slender. Though the spine at the end of the palm of the larger chela is directed somewhat downwards, there is no swollen tubercle at its base. In many respects the specimen resembles

the subspecies *mayaguensis* Coutière, but it has the carpopocrite less broad and reaching less far beyond the antennula.

Type locality. Marco, Collier Co., S.W. Florida, U.S.A.; in sponges.

Distribution. East coast of America (Florida to S. Brazil and the West Indies), and Lower California. So far the species was not known from Suriname.

### ***Synalpheus brooksi* Coutière, 1909**

#### Coquette Investigations

Station 302, between the mouths of the Coppename and Suriname Rivers, 6° 49' N 55° 25' W; in sponge; bottom mud and fine shells; depth 44 m; 28 June 1957. — 6 specimens. (W + L)

Description. Coutière, 1909, p. 69, fig. 41.

Remarks. The specimens show some minor differences from Coutière's description of the species. Both the scaphocerite and the spine of the carpopocrite reach beyond the end of the second segment of the antennular peduncle. The spines on the dorsal surface of the telson are longer. The large chela of my specimens resembles most that figured by Coutière (1909) in his fig. 41KB. The smaller first leg is slightly less slender than those figured by Coutière. The exopod of the uropod shows two teeth on the outer margin, but in some specimens an indication of a third tooth is visible on either the left or the right uropod.

Type locality. Sugar Loaf Key, Florida, U.S.A.

Distribution. Florida and the Bahamas to Yucatan and Brazil. The species is now reported for the first time from Suriname.

#### Family Hippolytidae

### ***Merguia rhizophorae* (Rathbun, 1900) (textfigs. 15 and 16)**

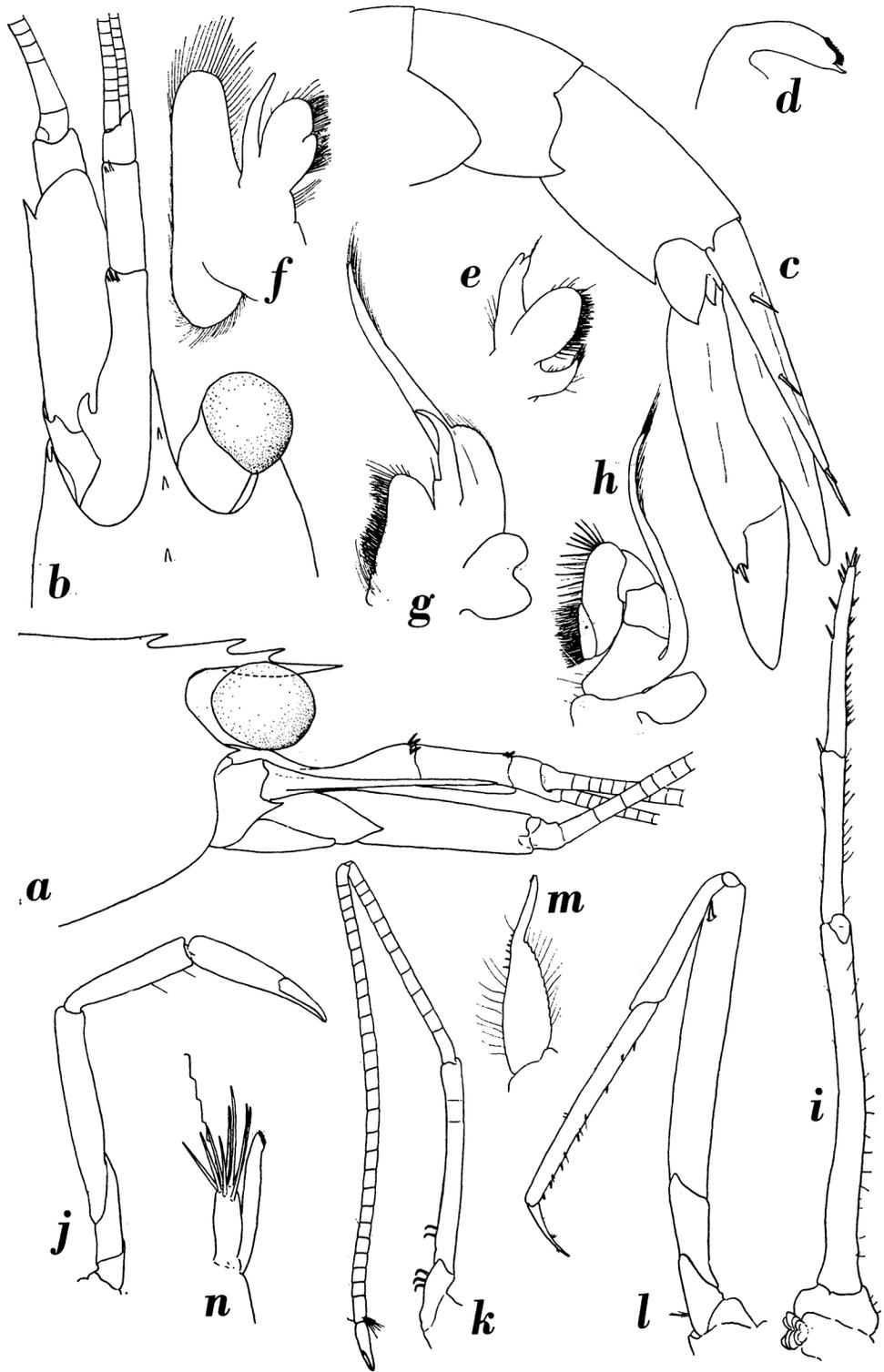
#### Museum Leiden

Small ditch near Matappica Canal, behind „Matappica” Fishery Experiment Station, N. of Alliance; 6 April 1957; L. B. Holthuis no. 1221. — 18 specimens.

Description. The length of the specimens ranges from 13 to 25 mm. The rostrum is slender and in the larger specimens it reaches slightly beyond

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Fig. 15. *Merguia rhizophorae* (Rathbun). a, anterior part of body in lateral view; b, anterior part of body in dorsal view; c, posterior part of abdomen in lateral view; d, mandible; e, maxillula; f, maxilla; g, first maxilliped; h, second maxilliped; i, third maxilliped; j, first pereopod; k, second pereopod; l, third pereopod; m, endopod of first pleopod of male; n, appendix interna and appendix masculina of second pleopod of male. Specimen from near Fishery Service Station „Matappica”, Suriname. a-c, i-l, × 10; d-h, m, × 25; n, × 50.



the eyes but fails to attain the end of the basal segment of the antennular peduncle. Its dorsal margin bears three teeth, one of which is placed behind the orbit, the two others are situated on the rostrum proper. The tip is slender and sharply pointed. No teeth are found on the lower margin. In dorsal view the rostrum is narrowly triangular. In the juveniles the rostrum is shorter, failing to reach the end of the eyes; its dorsal armature is reduced and consists of two teeth, or even of just one. The carapace of the species bears a distinct and sharp antennal spine on the lower orbital angle, no other spines are present; the pterygostomian angle is broadly rounded.

The pleurae of the first four abdominal somites are rounded, that of the fifth ends in a posteriorly directed tooth. The sixth somite is 1.5 times as long as the fifth and practically as long as the telson. The pleura of the sixth somite is pointed, the postero-lateral angle is truncated with the upper part of the truncated margin ending in a distinct tooth. The dorsal surface of the telson bears two pairs of strong spines, which are placed at about  $1/3$  and  $2/3$  of the length of the telson. The posterior margin of the telson is truncated and bears two pairs of spines, the inner of which are longer and stronger than the outer. Two strong feathered setae are placed between the inner spines.

The eyes are large. The cornea is globular and distinctly broader than the stalk.

The antennular peduncle is long and slender. The stylocerite is short and blunt, it fails to reach  $1/3$  of the length of the basal segment of the peduncle. The dorsal surface of the segment bears a transverse row of two or three spinules before the distal margin. The second segment of the peduncle is about half as long as the first and twice as long as the third, it also bears a few (generally one or two) subterminal spinules. The two flagella are simple, the outer has about 30 of the basal joints thickened.

The scaphocerite is 2.5 to 3 times as long as broad. The outer margin is about straight and ends in a distinct tooth, which, however, does not reach the end of the lamella. The antennal peduncle is about as long as the antennular peduncle and reaches distinctly beyond the scaphocerite. A sharp spine is present in the basal part of the outside of the antennal peduncle below the base of the scaphocerite.

The mandible lacks the incisor process and bears no palp. The maxillula has the palp bilobed, the upper lacinia is broad, the lower short and narrow. The maxilla has the scaphognathite well developed with the lower margin rounded; the palp is long and slender; the upper endite is distinctly bilobed. The first maxilliped has the exopod long with a distinct caridean lobe; the epipod is bilobed; the palp shows a distinct notch in the basal part of the

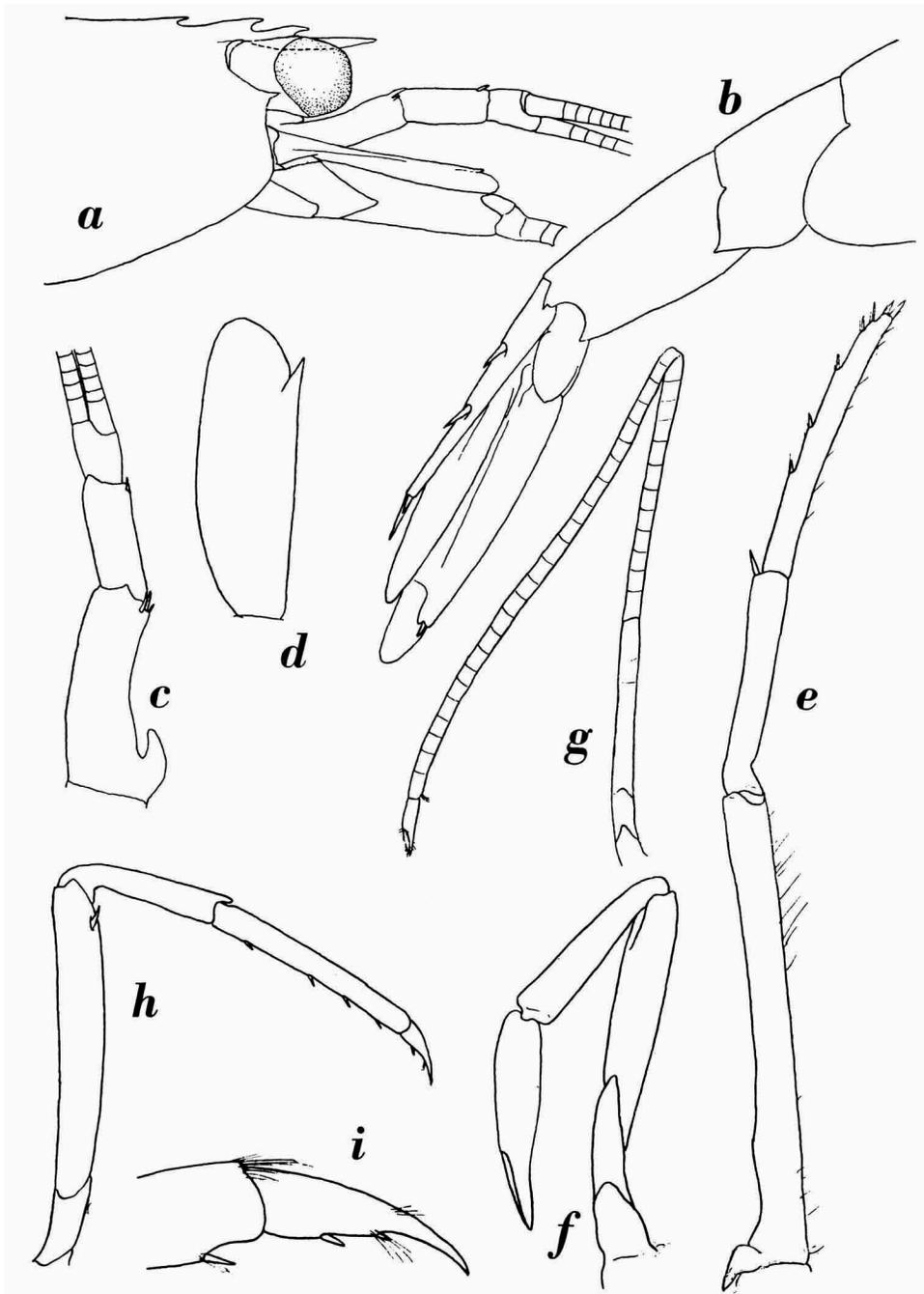


Fig. 16. *Merguia rhizophorae* (Rathbun), holotype. a, anterior part of body in lateral view; b, posterior part of abdomen in lateral view; c, antennula; d, scaphocerite; e, third maxilliped; f, first pereiopod; g, second pereiopod; h, third pereiopod; i, dactylus of third pereiopod. a-h,  $\times 9$ ; i,  $\times 36$ .

inner margin. The exopod of the second maxilliped is also well developed; an epipod but no podobranch is present. The third maxilliped reaches with a small part of the penultimate segment beyond the scaphocerite. The distal part of the last segment bears some spines, it is slightly longer than the penultimate segment, which bears a distal spine on the external margin. The antepenultimate segment is about as long as the ultimate two together. No trace of an exopod is visible on this maxilliped, but an epipod and an arthrobranch are present.

The branchial formula of the present species is as follows:

	maxillipeds			pereiopods				
	1	2	3	1	2	3	4	5
pleurobranchs	—	—	—	1	1	1	1	1
arthrobranchs	—	—	1	—	—	—	—	—
podobranchs	—	—	—	—	—	—	—	—
epipods	1	1	1	—	—	—	—	—
exopods	1	1	—	—	—	—	—	—

The first pereiopod reaches with the fingers beyond the scaphocerite. The fingers are more than half as long as the palm. The carpus is somewhat shorter than the chela. The merus is about  $\frac{4}{3}$  of the length of the chela. The second legs are equal. They reach with the mero-carpal articulation slightly beyond the base of the second segment of the antennular peduncle. The chela is small. The carpus consists of 24 to 27 articles (in juveniles less, sometimes as few as 20) and is fully twice as long as the merus which is subdivided into 10 to 14 articles. The ischium is somewhat shorter than the merus and shows traces of a subdivision in its distal part. The proximal part of the inner margin of the ischium, as well as the inner margin of the basis, bears some strong hooked hairs. The third leg reaches with more than half the propodus beyond the scaphocerite. The dactylus is slender and simple. The propodus is about 3.5 times as long as the dactylus. Its posterior margin bears about 5 spinules. The carpus is distinctly more than half as long as the propodus. The merus is much longer and more heavy than the propodus; it shows a strong spine in the distal part of the outer surface. The two following pairs resemble the third leg.

The first pleopod of the male has the endopod oval with a distinct appendix interna on top; in the second male pleopod the appendix masculina is much shorter than the appendix interna, and bears several strong distal spines. The uropods are longer than the telson. The exopod has the outer margin ending in two teeth between which there is a movable spine. A diaeresis is present.

Remarks. The holotype of this species, an ovigerous female, was examined by me in the U.S. National Museum, Washington, D.C. It agrees in all important points but one with the present Suriname material, the sole difference being found in the shape of the dactyli of the last three pairs of pereopods. Instead of being simple, this dactylus bears two posterior spines and is less slender. In this respect the dactyli of the type strongly resemble those found in the Indo-West Pacific *Merguia oligodon* (De Man), where in both males and females these two posterior spines are present. With the material at hand it is difficult to explain the nature of the difference between the holotype and the Suriname material. Possibly the short and spiniferous dactylus is only found in ovigerous females of *M. rhizophorae* (though in *M. oligodon* it occurs in both sexes); it must be admitted, however, that perhaps this difference is of a specific nature. More material must decide this question.

The eggs of the holotype are in an advanced stage of development and measure 0.5 to 0.9 mm in diameter.

*Merguia rhizophorae* closely resembles the only other species of this genus, *Merguia oligodon* (De Man), which is known from the Mergui and Malay Archipelagoes. The most striking difference between the two is that in the males of *M. rhizophorae* the dactylus of the last three pairs of pereopods is slender and unarmed.

The present species was described in 1900 under the name *Hippolysmata rhizophorae* by Rathbun. No later records have been published and until now its true generic status was not known.

Type locality. Rio Parahyba do Norte, Parahyba State, N.E. Brazil; on mangroves.

Distribution. Until now the species was only known from the original record.

Occurrence in Suriname. The present specimens were found in a ditch near the Fishery Experiment Station "Matappica" on the Matappica Canal, which connects the Matappica Creek (belonging to the Commewijne River system) with the sea (pl. IV). The locality lies to the N.E. of Paramaribo. The type and only specimen known so far is an ovigerous female of 27 mm, which was found "on mangroves". This seemed such a peculiar habitat for a shrimp, that before having collected the species myself, I considered the indication "on mangroves" as highly dubious. Now, however, after knowing more of the habits of the species of the genus *Merguia*, it seems quite probable that Rathbun's indication is correct. Twelve specimens of the present species were found by Dr. Geijskes and myself among grass roots of a turf sod which we tore off the side of a ditch at least 0.2 m above the

water level. This ditch connected several artificial fish ponds of the Fisheries Experiment Station "Matappica" with the Matappica Canal. The ditch is in open connection with the canal, and thus with the sea, while it is separated from the fish ponds by a wooden sluice; it is located at about 2 km from the sea. It is about 2 m wide, and at the time of collecting it was less than 0.5 m deep, with a muddy bottom and rather steep sides, bare and only in the extreme upper part covered with grass and short herbs. The salinity of the water in the ditch is rather variable. The exact values are not known to me, but the salinity of the water of the Matappica Canal on 6 April 1957 was 26.5‰ (Dr. Geijskes, in litt.). It has been reported for the years 1952 and 1953 to vary between 6 and 22‰, and for 1954 between 7 and 61‰ (Lijding, 1956, p. 115; 1957, p. 122). As a rule the salinity varies between 12 and 19‰ (Dr. Geijskes, in litt.). In the rainy season the salinity is lowest because of the fact that (1) the water then is directly diluted with rain water, (2) more fresh water is carried by the rivers so that the sea water can penetrate less far into the estuaries, and (3) the evaporation is less strong than in the dry season.

The water in the ditch is under tidal influence and the place where the shrimps were found at low tide must have been below water level at high tide. It remains unusual, however, to find shrimps out of the water, even if in humid conditions.

The general shape of the specimens shows a strong resemblance to that of specimens of the genus *Processa*, and when collected they at first were supposed to belong to the latter genus. As it is known that *Processa* is nocturnal in its habits and is far more easy to collect at night than in the daytime, Dr. Geijskes and I decided to make another search for the shrimps at night, since apart from the twelve specimens found among the grass roots we had not been able to locate any additional material. Between 10 and 11 o'clock at night the same locality was again visited. Hauls with the hand net in the fish ponds yielded only small specimens of *Penaeus aztecus*. In the ditch where we had collected *Merguia* in the daytime, we at first did not meet with success either, probably because of lack of vegetation in the water. At one place, however, some of the plants growing alongside the ditch had fallen over and were hanging in the water. It was in this spot only that we managed to obtain additional material of *Merguia*, which we had not found among these plants in the daytime. It seems probable therefore that *Merguia*, like *Processa*, is nocturnal in its habits.

It is interesting to compare the habits of *Merquía rhizophorae* with those of the Indo-West Pacific *M. oligodon*. A specimen of the latter species was found by me in February 1955 at low tide under the bark of a tree on the beach near the village of Sarawandori, on the south coast of Japen Island, Netherlands New Guinea (see Holthuis, 1958, p. 233). Like *M. rhizophorae*, *M. oligodon* may evidently occupy habitats that are left exposed at low tide, if they are sufficiently humid for survival. The find of the Indo-West Pacific species on the trunk of a tree immediately recalls Rathbun's (1900) statement that the type of the American species was found "on mangroves".

### **Hippolysmata (Hippolysmata) wurdemanni** (Gibbes, 1850)

#### Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 27 m; 29 April-3 May 1957; fifth voyage. — 2 specimens. (L)

Station 23, off the mouth of the Suriname River, 6° 24' N 54° 59.5' W; bottom shells; depth 27 m; 12 May 1957. — 1 ovigerous female. (W)

Station 24, off the mouth of the Suriname River, 6° 23.5' N 55° 00' W; bottom mud and shells; depth 27 m; 12 May 1957. — 1 ovigerous female. (W)

Station 86, N. of Isle de Salut, French Guiana, 5° 49.5' N 53° 09' W; bottom rocky with mud, coral and shells; depth 27 m; 22 May 1957. — 7 specimens (6 ovigerous). (L)

#### Museum Leiden

Off the coast of French Guiana, about 5° 56' N 52° 47' W; depth 30 m; 20 May 1954; J. Durand no. 60. — 1 ovigerous female.

Description. Hay & Shore, 1918, p. 392, pl. 26 fig. 12.

Remarks. The present material was compared with two specimens from St. Augustine, Florida, U.S.A. (from buoy, 25 January 1935, G. Robert Lunz; 41 and 46 mm) and 6 specimens from Boca Geiga Bay, Pine Key, Florida (January 1884, H. Hemphill; 24-34 mm, including 2 ovigerous females 30 and 34 mm). The Guiana specimens are 24 to 49 mm long, the ovigerous females measuring 31 to 49 mm. In the Florida specimens the rostral formula is  $\frac{1+4+0}{3-5}$ , while in the Guiana specimens it is  $\frac{1+4-6+0}{3-5}$ , but as only one of the specimens had 7 and one 5 dorsal rostral teeth the formula in the majority of the specimens from Guiana is  $\frac{1+5+0}{3-5}$ . In most of the Coquette material the stylocerite falls only slightly short of the end of the basal segment of the antennular peduncle, being longer than in the Florida material, but in the specimens from Station 24 and in those of the fifth voyage of the "Coquette" the stylocerite is as in the typical form. The scaphocerite has the final tooth usually shorter than in the Florida specimens, reaching hardly if at all beyond the lamella;

the lamella itself is more squarely truncated. The legs in the Guiana specimens are somewhat more slender than in the northern material. The number of carpal articulations of the second leg in my Guiana specimens varies between 33 and 37, in the Florida material between 27 and 31. More material from a greater number of localities should be studied before a decision can be reached as to whether two different forms are involved here.

Type locality. Key West, Florida, and Charleston Harbor, South Carolina, U.S.A. Since the Florida material was collected by Dr. F. Wurdemann, for whom the species is named, the type locality may be restricted to Key West.

Distribution. All previous records but one deal with specimens found on the coasts of the United States between the lower part of Chesapeake Bay and N. W. Florida. The one exception is Rathbun's (1900) record of the species from Mamanguape, Parahyba State, N. E. Brazil. *Hippolysmata wurdemanni* is now reported for the first time from Suriname and French Guiana.

***Hippolysmata (Exhippolysmata) oplophoroides* Holthuis, 1948**  
(textfig. 17)

*Hippolysmata (Exhippolysmata) oplophoroides* Holthuis, 1948, p. 1106, figs. 2, 3; Holthuis, 1950a, p. 35.

Coquette Investigations

About 20 miles off the coast of Suriname between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 ovigerous female. (L)

About 20 miles N. of the mouth of the Marowijne River; depth 27 m; 23-27 April 1957; fourth voyage. — 2 ovigerous females. (L)

Near "Suriname Rivier" lightvessel; depth 7 m; 3 May 1957; fifth voyage. — 2 specimens (1 ovigerous). (L)

About 20 miles N. of the mouth of the Suriname River; depth 27 m; 6-9 May 1957; sixth voyage. — 64 specimens (50 ovigerous). (L)

Station 1, off the mouth of the Suriname River, 6° 22' N 55° 06' W; bottom mud; depth 26 m; 11 May 1957. — 7 specimens (5 ovigerous). (W)

Stations 39 and 40, N.E. of the mouth of the Suriname River, 6° 19' N 54° 58' W and 6° 20.5' N 54° 57' W; bottom mud; depth 16 and 18 m; 13 May 1957. — 20 specimens (18 ovigerous). (W)

Station 44, N.E. of the mouth of the Suriname River, 6° 18.5' N 54° 51' W; bottom mud; depth 18 m; 13 May 1957. — 6 ovigerous females. (W)

Station 49, N.E. of the mouth of the Suriname River, 6° 04' N 54° 51' W; bottom mud; depth 5 m; 13 May 1957. — 1 ovigerous female. (W)

Station 167, between the mouths of the Coppename and Suriname Rivers, 6° 18.5' N 55° 28' W; bottom mud and shells; depth 18 m; 6 June 1957. — 13 specimens (11 ovigerous). (W)

Museum Leiden

British Guiana; leg. Miss V. Graham; don. British Museum. — 3 specimens (1 ovigerous).

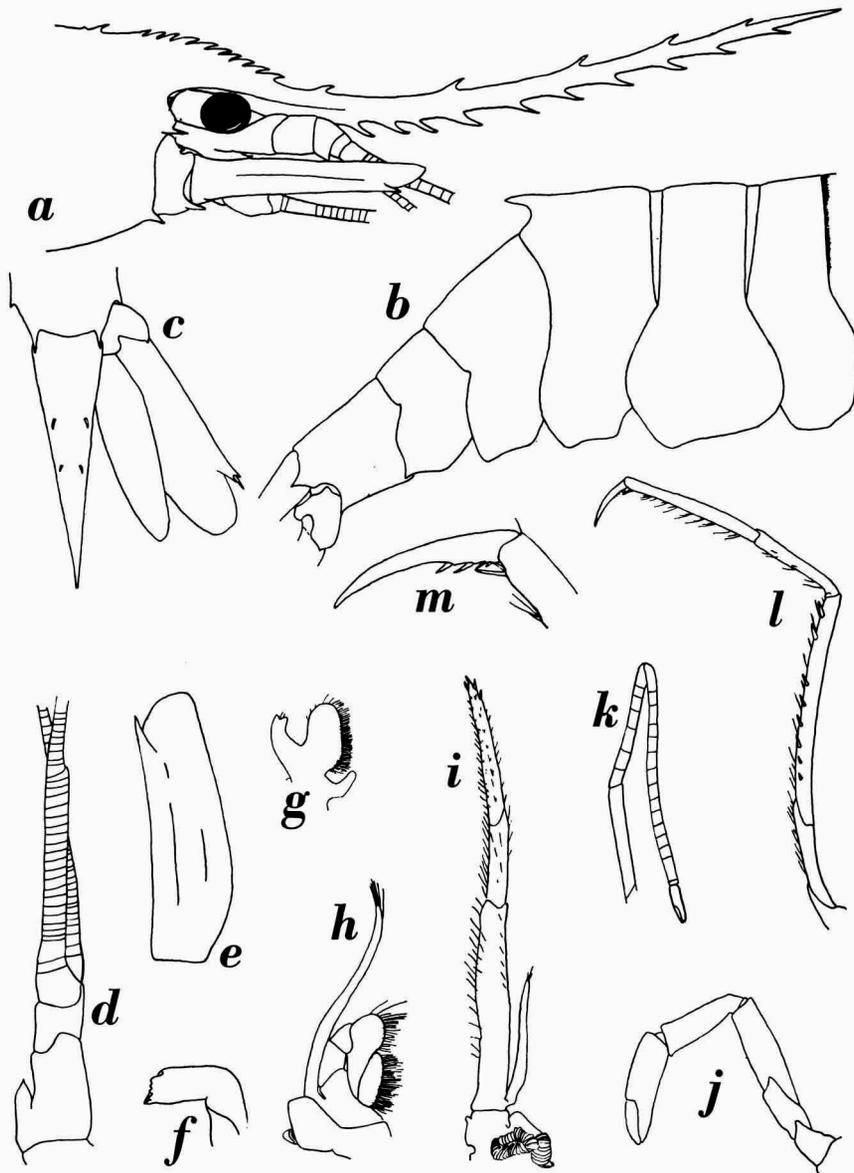


Fig. 17. *Hippolysmata (Exhippolysmata) oplophoroides* Holthuis. a, anterior part of body in lateral view; b, abdomen in lateral view; c, telson and uropod in dorsal view; d, antennula; e, scaphocerite; f, mandible; g, maxillula; h, second maxilliped; i, third maxilliped; j, first pereopod; k, second pereopod; l, third pereopod; m, dactylus of third pereopod. Specimen from Suriname River near Resolutie. a-c, i-l,  $\times 5$ ; f-h,  $\times 8$ ; m,  $\times 19$ . After Holthuis, 1948.

Mouth of the Nickerie River; bought at the fishmarket of Nieuw Nickerie; September 1953; D. C. Geijskes. — 1 specimen.

Mouth of the Coppename River near Coppename Punt; 25 October 1949; R. M. J. Wirtz. — 2 specimens.

Mouth of the Coppename River near Saramacca Punt; 2 April 1957; L. B. Holthuis no. 1215. — 28 specimens (21 ovigerous).

Between "Suriname Rivier" lightvessel and the Suriname coast; 27 July 1953; D. C. Geijskes. — 2 ovigerous females.

Mouth of the Suriname River near Braampunt; 4 and 5 April 1957; L. B. Holthuis nos. 1217 and 1218. — 94 specimens (75 ovigerous).

Mouth of the Suriname River near Resolutie; bottom muddy; water brown, salinity 15.89‰; 22 December 1942; D. C. Geijskes — 2 ovigerous females.

Mouth of Suriname River; bought at Paramaribo fishmarket; 1 March 1953, D.C. Geijskes; 1 April 1957, L. B. Holthuis no. 1207. — 15 specimens (1 ovigerous).

Near Cayenne, French Guiana; 1955; J. Durand. — 3 specimens (2 ovigerous).

Description. Holthuis, 1948, p. 1106, figs. 2, 3.

Vernacular names. Near the mouth of the Coppename River the species is named "kaka" by the fishermen. The word "kaka" means "cock", and in this connection it is interesting to note that Graham (1955, p. 40), when dealing with specimens of this species from British Guiana, gave it the name of "Cock Shrimp". At the mouth of the Suriname River the name "tranga bakka", meaning "strong back", is given to this species; this name may refer to the characteristic strong dorsal spine of the third abdominal somite.

Remarks. The specimens examined range in length between 42 and 79 mm. The ovigerous females are 50 to 79 mm long, they were found in the months April, May, June, July, and December.

Graham's (1955, p. 40) statement that the species has only the first pair of legs chelate is misleading. The second pair, which are very slender, do have chelae, though these are small and may be easily overlooked.

Colour. The general colour impression given by living specimens is pink. The rostrum and the anterior part of the carapace are pink; the posterior part of the carapace being white and yellowish. The abdomen is white and pink, the pink colour being especially distinct along the posterior margins of the first to fourth somites. The spine on the third somite is almost red. The fifth and sixth somites are entirely pink. The tailfan is red, except for the basal part which is pink. The antennular and antennal flagella are pink. The legs are red, being sometimes purplish in their distal part. The pleopods are also of a red colour. The eggs are yellow or greenish.

Type locality. Mouth of the Suriname River near Resolutie, Suriname.

Distribution. The range of the species extends along the Atlantic coast of America from North Carolina to Brazil. In a mimeographed report Lunz (1955) gave the following localities for the present species: North Carolina (off Cape Fear River), South Carolina (off Kiawah Island), and off

the coasts of Georgia, Texas and Brazil. Graham (1955, pp. 40, 77, pl. 5 fig. 13, under the names "Cock Shrimp" and *Exhippolysmata oplophoroides*) and Lindner (1957, pp. 2, 21, under the name *Hippolysmata oplophoroides*) reported the species from British Guiana; Lindner stated that in British Guiana this species and *Palaemon schmitti* are more abundant than *Xiphopenaeus*. Dr. J. Durand of the Institut Français d'Amérique Tropicale, Cayenne, in 1955 sent me material from off the coast of French Guiana; the species is found there off Cayenne and off the mouth of the Approuague River. Dr. Durand informed me that specimens of this species "semblent peu abondants et se trouvent en petit nombre en estuaire et dans la zone littorale proche, mélangés aux *Xiphopenaeus*".

Occurrence in Suriname. *Hippolysmata oplophoroides* is found in the estuaries of the Suriname rivers and is caught there by the fishermen fishing for *Xiphopenaeus* and *Palaemon schmitti*. When sold, *Palaemon schmitti* is separated from *Xiphopenaeus*, *Hippolysmata* being left in with *Palaemon*, where it forms only a negligible percentage of the total quantity. The previous Suriname records of the species are: Mouth of Coppename River near Coppename Punt (Holthuis, 1950a), mouth of Suriname River near Resolutie (Holthuis, 1948).

#### Family Processidae

#### **Processa guyanae** new species (textfigs. 18, 19)

##### Coquette Investigations

Stations 281 and 282, between the Coppename and Suriname Rivers, 6° 46' N 55° 36.5' W and 6° 46.5' N 55° 38' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 1 specimen. (W)

Station 287, N.E. of the Coppename River, 6° 52' N 55° 50' W; bottom mud, shells and coral; depth 48 m; 26 June 1957. — 2 specimens (1 ovigerous). (L)

Station 306, N.W. of the Coppename River, 6° 54' N 56° 14' W; bottom shells and coral; depth 49 m; 7 July 1957. — 1 specimen. (W)

Station 353, off the mouth of the Suriname River, 6° 45.5' N 55° 14' W; bottom mud and fine shells; depth 44 m; 21 July 1957. — 2 specimens (1 ovigerous). (W)

Description. The specimens are 23 to 35 mm long, the two ovigerous females are 28 and 35 mm in length.

The rostrum is slender, straight, and reaches almost to the end of the eyes. The tip is bifid, the lower tooth reaching slightly beyond the upper. The lower margin of the rostrum is somewhat convex in its proximal half, slightly concave in the distal part. Hairs are implanted on the lower margin of the rostrum and at the tip. The carapace shows no post-orbital groove. The lower orbital angle is inconspicuous and broadly rounded. The anterior margin of

the carapace between this angle and the antennal spine is only slightly concave. The antennal spine itself is well developed.

The fifth abdominal somite has the distal margin of the pleurae about

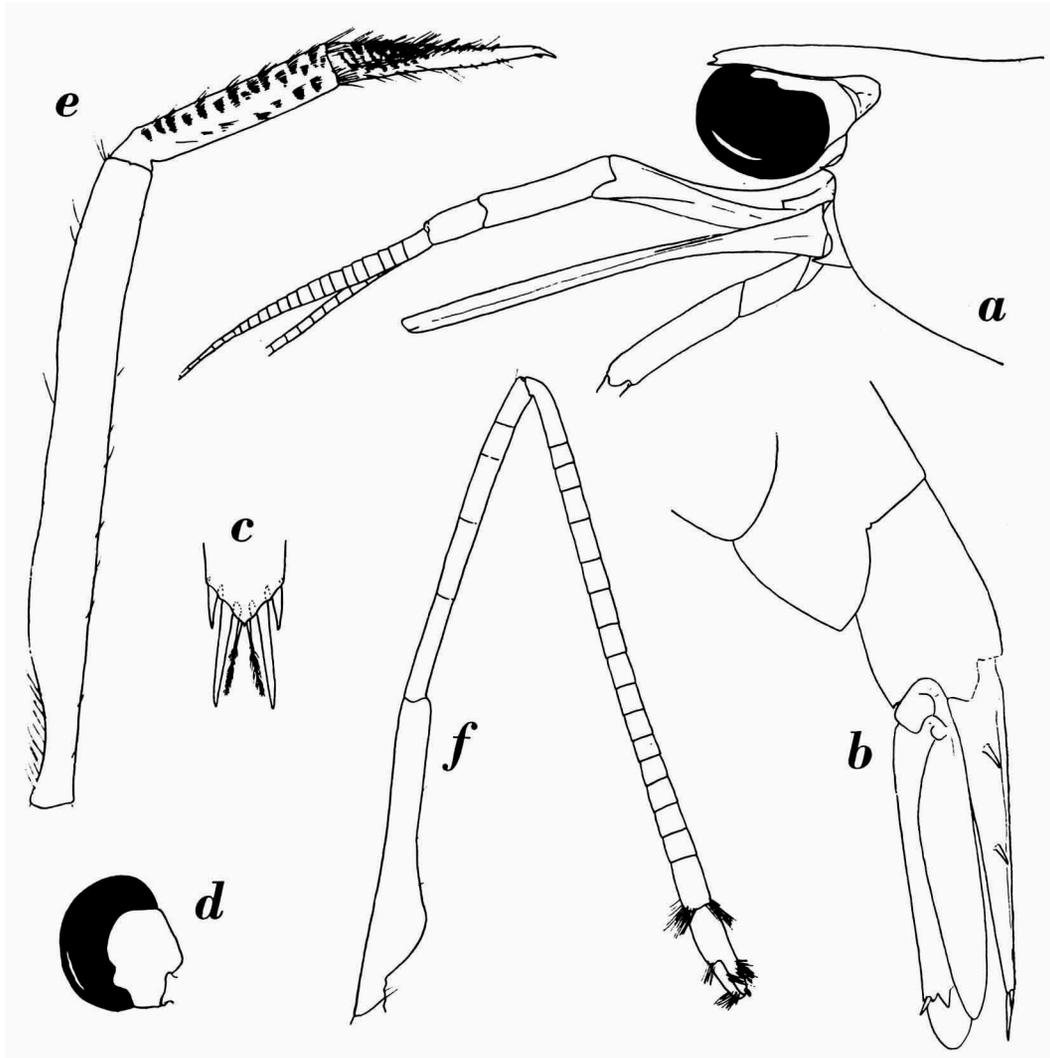


Fig. 18. *Processa guyanae* new species. a, anterior part of body in lateral view; b, posterior part of abdomen in lateral view; c, tip of telson in dorsal view; d, eye in dorsal view; e, third maxilliped; f, left second pereiopod. a-e, female from "Coquette" Sta. 287; f, female from "Coquette" Sta. 353. a, b, d-f,  $\times 10$ ; c,  $\times 28$ .

straight or even slightly concave. The postero-lateral angle does not show a tooth, but is approximately rectangular. The sixth segment is less than 1.5

times as long as the fifth. The pleura is pointed. The truncated postero-lateral process of the somite, which overhangs the antero-lateral angle of the telson, does not show any tooth on the posterior margin. The telson is less than three times as long as broad, and dorsally shows a distinct median groove. The posterior margin forms a median angle, the tip of which ends in a minute point. There are two pairs of posterior spines; the outer of these are less than half as long as the inner. Between the inner spines there are two setose hairs, which are almost as long as the spines themselves.

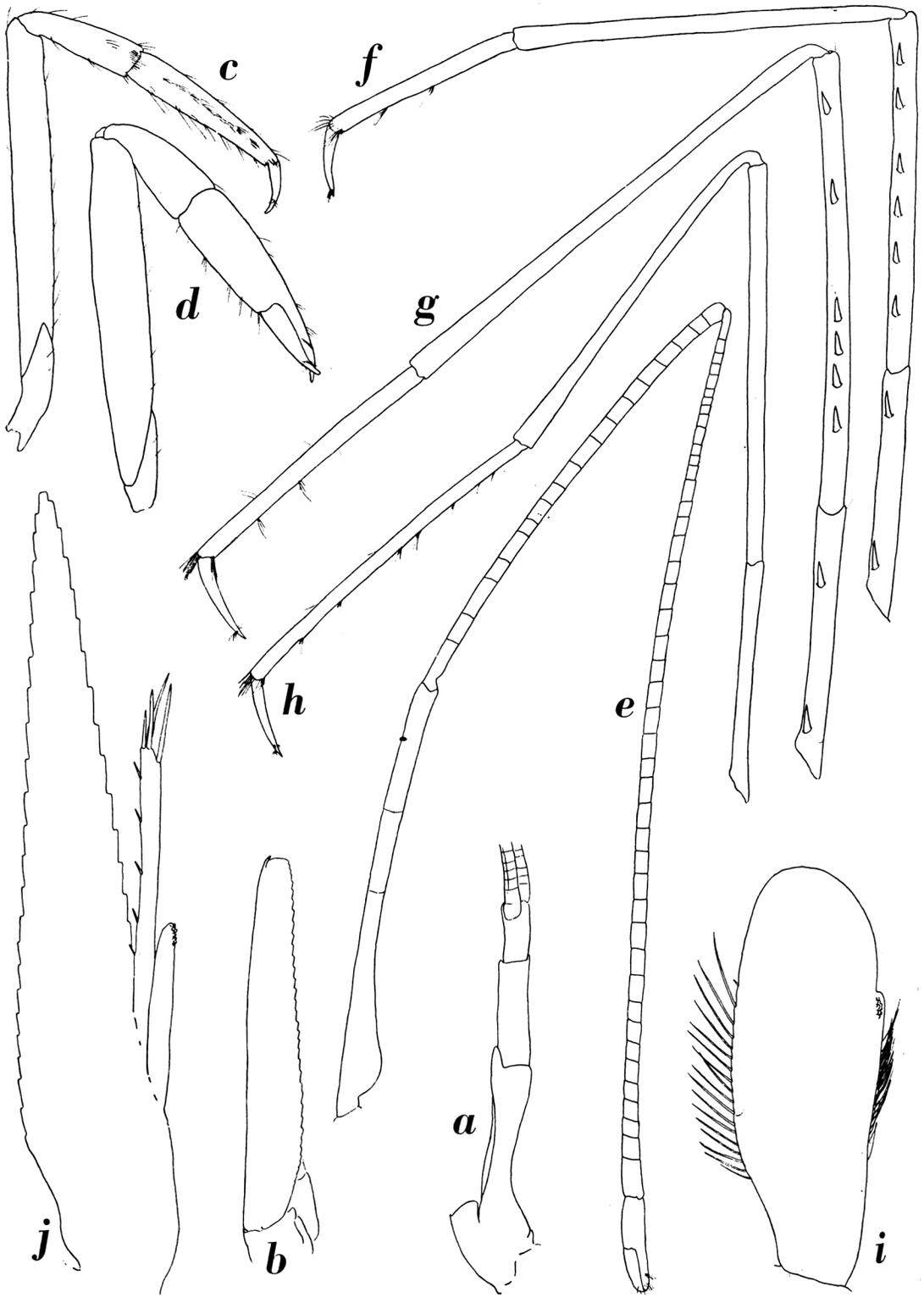
The eyes are very large and flattened dorsally. In lateral view the cornea is slightly longer than high, in dorsal view it is very short compared to its width. The peduncle is very short in lateral view; in dorsal view it is broad and has the outer margin slightly more than half as long as the inner.

The antennular peduncle reaches with about  $\frac{1}{3}$  of the length of the basal segment beyond the rostrum. The stylocerite is short with the anterior margin broadly truncated. This margin is straight or slightly convex, with a faint indication of an external antero-lateral tooth. In the females the second segment of the peduncle is about twice as long as the third; in the males the third is only slightly shorter than the second. The thin distal part of the outer flagellum in the male is shorter than the thickened basal part, in the females these two parts are of about equal length. In the males the thickened part consists of 23 to 27 joints, in the females of 17 to 24.

The scaphocerite distinctly overreaches the antennular peduncle, but the difference is less than the length of the third antennular segment. The length of the scaphocerite is about 6.5 times its breadth. For its larger part the outer margin is straight, only the distal part is somewhat convex and the final tooth is curved inwards. This tooth hardly at all overreaches the end of the lamella. The antennal peduncle reaches about to the middle of the second segment of the antennular peduncle. A spine is present below the external part of the base of the scaphocerite.

The third maxilliped reaches with the distal two segments beyond the scaphocerite. The ultimate segment ends in a point and bears some spines on the dorsal margin, it is about as long as the penultimate segment and measures about  $\frac{3}{8}$  of the length of the antepenultimate segment. A well developed exopod and an epipod are present.

The first legs reach with the mero-carpal articulation to or almost to the end of the basal segment of the antennular peduncle. The left leg has the dactylus simple and about  $\frac{1}{3}$  as long as the propodus; no chela is present here. The propodus is quite slender, being about five times as long as broad. The carpus measures about  $\frac{3}{4}$  of the length of the propodus. The merus is about twice as long as the propodus. The right leg is chelate. The fingers are about



$\frac{2}{3}$  as long as the palm. The carpus is somewhat shorter than the palm. The merus is about as long as carpus and chela combined. There is no arthrobranch at the base of the first legs. Pleurobranchs are present on all the legs. The second pereiopods are strongly unequal. The right reaches with the mero-carpal articulation beyond the scaphocerite, sometimes it even reaches with half the merus beyond that scale. The chela has the fingers slightly shorter than the palm. The carpus is about 9 times as long as the chela and consists of 44 to 47 articles. The merus is somewhat more than half as long as the carpus and is subdivided in 18 to 20 articles. The ischium is slightly shorter than the merus; it shows two articulations in its distal half and bears a lobe on the inner side of its proximal half. The left second leg reaches with the mero-carpal articulation to or almost to the end of the eyes. The fingers are shorter than the palm. The carpus is more than five times as long as the chela and consists of 17 or 18 articles. In the merus three to five distinct and some indistinct articulations may be seen; its length is about  $\frac{3}{5}$  of that of the carpus, and it is somewhat longer than the ischium. Like in the right leg the ischium shows a lobe on the inner margin of the basal part. The third leg reaches with half or more than half the carpus beyond the scaphocerite. The propodus is about three times as long as the dactylus; it bears some hairs but no spines on the posterior margin. The carpus is almost twice as long as the propodus. The merus is somewhat shorter than the carpus and on its outer surface is provided with a longitudinal row of about 6 or 7 strong spines. The ischium is about  $\frac{3}{5}$  of the length of the carpus and on its outer surface bears two strong spines. The length of propodus and carpus combined is about equal to that of ischium and merus combined. The fourth leg reaches with more than half to about the entire carpus beyond the scaphocerite. It is much longer than the third leg. The propodus is about three times as long as the dactylus and is slightly more than half as long as the carpus; it bears no spines. The merus is distinctly shorter than the carpus; on the outer surface it shows a longitudinal row of 5 or 6 strong spines. The ischium measures about  $\frac{4}{7}$  of the length of the merus; it has two strong spines on its outer surface. The combined length of propodus and carpus far exceeds that of ischium and merus. The fifth leg reaches with about half the carpus (sometimes with somewhat more, sometimes with less) beyond the scaphocerite. The propodus is about 4 times as long as the dactylus and bears about 5 or 6 spines on the posterior margin. These spines are separated by

Fig. 19. *Processa guyanae* new species. a, antennula; b, scaphocerite; c, left first pereiopod; d, right first pereiopod; e, right second pereiopod; f, third pereiopod; g, fourth pereiopod; h, fifth pereiopod; i, endopod of first pleopod of male; j, endopod of second pleopod of male (hairs omitted). a-h, female from "Coquette" Sta. 287; i, j, male from "Coquette" Sta. 287. a-h,  $\times 10$ ; i, j,  $\times 50$ .

wide intervals, the ultimate of them being placed near the base of the dactylus. The carpus is only slightly longer than the propodus. The merus is slightly longer than the carpus. The ischium measures about  $\frac{3}{5}$  of the length of the merus. Neither merus nor ischium shows any spines.

The endopod of the first male pleopod is about half as long as the exopod. The distal part is broadly rounded and has no hairs. The retinacular lobe is only slightly produced. The endopod of the second male pleopod has a longitudinal row of spinules along the outer margin of the appendix masculina; the top of the appendix bears four strong spines, the inner of which is placed on a lower level than the others. The abdominal sternites bear no spines, except for the sixth which is provided with a small preanal spine. The protopodite of the uropods ends posteriorly in a broadly rounded lobe. The outer margin of the exopod ends in two blunt teeth between which there is a movable spine. The diaeresis is distinct and bears two broad acute triangular posteriorly directed teeth; one of these is placed close to the outer margin, the second lies at the inner end of the diaeresis.

The eggs are numerous and small, being 0.4 to 0.6 mm in diameter.

Remarks. Until now only three species of *Processa* have been reported from Atlantic American waters: *Processa canaliculata* Leach, 1815, *Processa bermudensis* (Rankin, 1900), and *Processa wheeleri* Lebour, 1941. In the course of time many species have been confused under the name *Processa canaliculata*, and it is quite possible that all the American material indicated in the literature with that name actually belongs to entirely different species. At present *Processa canaliculata* is known with certainty only from European waters (from the North Sea to the eastern Mediterranean). *Processa bermudensis* and *P. wheeleri* both have been reported from Bermuda, no other reliable records being available; it is possible that all or part of the American records of *P. canaliculata* pertain to these two species. A revision of the American species of the genus *Processa* is badly needed. *Processa bermudensis* may immediately be distinguished from *P. wheeleri* and *P. guyanae* by the absence of the antennal spine. In many respects the present new species resembles *P. wheeleri*, but it may be separated from it by the following features: The number of carpal and meral articles of the right second leg is far smaller in *P. wheeleri*, being 23 and 7 respectively; in the left leg of that species these numbers are 15 and 5. The third maxillipeds and all the legs are much shorter in Lebour's species, while the ratio of the length of the various segments is different. Unfortunately no direct comparison of the present material with *P. wheeleri* could be made, since no material of the latter species was available. Of the European species it is *P. canaliculata* which resembles the present form most closely, but that species may be

distinguished from *P. guyanae* by that (1) the tip of the telson is rounded, (2) the stylocerite has the antero-external tooth much stronger, (3) the carpus of the right second leg has fewer articles, viz., 30 to 35, (4) the ratio of the length of the segments of the following legs is different, and (5) the exopod of the first male pleopod and the appendix masculina of the second male pleopod have a different shape (cf. Nouvel & Holthuis, 1957, p. 33, figs. 149-173).

Types. Holotype is the male specimen from "Coquette" Station 306, the other specimens are paratypes. The holotype is preserved in the collection of the U.S. National Museum in Washington, D.C.

#### Family Pandalidae

#### **Parapandalus longicauda** (Rathbun, 1901)

##### Coquette Investigations

Station 331, between the mouths of the Coppename and Suriname Rivers, 6° 51' N 55° 25' W; bottom mud and shells; depth 53 m; 20 July 1957. — 1 ovigerous female. (W)

Description. Rathbun, 1901, p. 117, fig. 24.

Remarks. The present specimen is referred with some doubt to Rathbun's species of which no material was available for comparison. The number of differences from Rathbun's original description is considerable and it is possible that the Suriname specimen represents an as yet undescribed species.

The rostrum is broken, the remaining part reaches beyond the scaphocerite for a distance about equal to  $\frac{1}{3}$  of the length of the latter. The upper margin bears numerous teeth, which are placed close together and of which the first four are placed behind the orbit; in the types of the species only two or three teeth are placed behind the orbit. In my specimen there are 28 dorsal and 15 ventral rostral teeth. The small median spine on the carapace mentioned by Rathbun is visible in my specimen as a blunt tubercle. The rostrum continues backwards as a distinct carina, which in my specimen becomes obsolete some distance behind the middle of the carapace.

The third maxillipeds, which Rathbun stated to be "a little longer than the antennal scale", in my specimen reach beyond that scale with the ultimate and half the penultimate segment. The penultimate segment in the Suriname specimen is about half as long as the ultimate and certainly not "subequal" as in the type. The first legs in my specimen reach with more than half the carpus beyond the scaphocerite, while in her description of *P. longicauda* Rathbun remarked: "The propodus of the first pair of feet reaches the end of the antennal scale". Some confusion must have taken place in Rathbun's description, since she continued: "Carpus and dactylus subequal; propodus

1.5 times as long as carpus". The dactylus of the first pereipod, like in all Pandalidae, is extremely small, so that Rathbun's statement must be incorrect. In my specimen the carpus is slightly shorter than the merus and about twice as long as the propodus. The second legs are equal and reach with the merocarpal articulation to about the end of the antennular peduncle; fully extended they reach with more than  $\frac{1}{3}$  of the carpus beyond the scaphocerite. The carpus consists of about 25 articles and is about 1.5 times as long as the merus. The fifth legs of my specimen are both defective, but it is still to be observed that they reach with part of the carpus beyond the scaphocerite.

The sixth abdominal somite is less than twice as long as the fifth and is rounded in the median dorsal line.

Type locality. Off N.W. Florida,  $28^{\circ} 42' 30''$  N  $85^{\circ} 29'$  W; 161 m depth.

Distribution. The species is known from the type locality and from Puerto Rico, having been taken in depths ranging from 53 to 411 m.

#### Section Stenopodidea

#### Family Stenopodidae

### **Stenopus scutellatus** Rankin, 1898

#### Coquette Investigations

Station 86, N. of Isle de Salut, French Guiana,  $5^{\circ} 49.5' N$   $53^{\circ} 09' W$ ; bottom rocky with mud, corals and shells; depth 27 m; 22 May 1957. — 1 specimen. (L)

Station 221, N.W. of the mouth of the Marowijne River,  $6^{\circ} 42.5' N$   $54^{\circ} 10' W$ ; bottom mud; depth 42 m; 14 June 1957. — 1 ovigerous female. (W)

Station 276, between the mouths of the Coppename and Suriname Rivers,  $6^{\circ} 41.5' N$   $55^{\circ} 31' W$ ; bottom shells and coral; depth 42 m; 25 June 1957. — 1 ovigerous female. (L)

Stations 281 and 282, between the mouths of the Coppename and Suriname Rivers,  $6^{\circ} 46' N$   $55^{\circ} 36.5' W$  and  $6^{\circ} 46.5' N$   $55^{\circ} 38' W$ ; bottom mud and fine shells; depth 46 m; 26 June 1957. — 1 specimen. (W)

Station 306, N.W. of the mouth of the Coppename River,  $6^{\circ} 54' N$   $56^{\circ} 14' W$ ; bottom shells and coral; depth 49 m; 7 July 1957. — 1 ovigerous female. (W)

#### Museum Leiden

Off the coast of French Guiana, about  $5^{\circ} 17' N$   $51^{\circ} 45' W$ ; depth 60 m; 30 August 1957; J. Durand no. 374. — 1 specimen.

Description. Holthuis, 1946, p. 28, pl. 3 figs. a, b.

Remarks. The present specimens measure 25 to 36 mm, the ovigerous females being 28 to 36 mm long.

The characters used to distinguish *Stenopus scutellatus* Rankin from *S. spinosus* Risso seem to be subject to a certain amount of variation. In the specimens examined the lateral surface of the rostrum is usually provided with a single spine, but in two specimens (from Sta. 276 and 281-282) there is one spine on one side, while there are two on the other. The upper surface

of the scaphocerite is generally smooth, but in some specimens (Sta. 221, 281-282) it shows one or two spines, or even a distinct row of 7 or 8 spines (Sta. 276). The base of the outer margin of the scaphocerite generally shows a single spine, sometimes having a minute spinule before it, but in one specimen (Sta. 276) one of the scaphocerites has two small spines placed in front of the basal one. The present species seems to be much smaller than *Stenopus spinosus*: while specimens of up to 73 mm are known of *S. spinosus*, the largest *S. scutellatus* recorded so far measured 36 mm, ovigerous females ranging between 23 and 36 mm.

Type locality. Silver Cay, New Providence, Bahama Islands; under coral near low water.

Distribution. The species is known from Bermuda, the Bahamas, the Gulf of Mexico, Glover Reef near British Honduras, St. Thomas, St. Martin, St. Eustatius, Barbados, Curaçao and Fernando Noronha. It is now reported for the first time from Suriname and French Guiana.

***Stenopus hispidus*** (Olivier, 1811)

Museum Leiden

Off the coast of French Guiana, about 5° 30' N 51° 39' W; depth 65 m; 10 July 1954; J. Durand no. 102. — 1 ovigerous female.

Description. Holthuis, 1946, p. 12, pl. 1 figs. a-g.

Remarks. The present specimen, an ovigerous female, is 47 mm long. It agrees well with the published accounts of the species.

Type locality. "Australasiatic Seas".

Distribution. Indo-West Pacific region (from the Red Sea and S.E. Africa to Japan, Hawaii and Tuamotu Islands), and West Indian region (from Bermuda and Florida to French Guiana and the West Indies). The species is now reported for the first time from French Guiana; it has not yet been collected in Suriname waters.

Supersection *Macrura Reptantia*

Section *Palinuridea*

Family *Palinuridae*

***Panulirus laevicauda*** (Latreille, 1817)

Coquette Investigations

Station 69, off the N.W. coast of French Guiana, 5° 58.5' N 53° 25' W; bottom coral and shells; depth 29 m; 21 May 1957. — 1 male. (L)

Station 354, between the mouths of the Coppename and Suriname Rivers, 6° 44'-6° 55' N 55° 14'-55° 31' W; bottom mud and fine shells; depth 44-46 m; 21 July 1957. — 1 male. (W)

Description. Gruvel, 1911, p. 45, fig. 21.

Remarks. The specimen from Station 69 is 95 mm long, the other measures 215 mm; both are males.

Colour. In the smaller specimen almost all colour has disappeared, but in the larger the colour pattern is still distinctly visible. The horns over the eyes are red with yellowish tips; about four, often interrupted white rings are present. The carapace itself is yellowish with a pinkish tinge, which in the median region becomes purplish; in the antero-lateral parts it is more reddish. A dark red ring is visible around the strong spine which is placed obliquely behind each of the horns. A whitish streak extends over the lateral part of the carapace; also the lateral margin is of that colour. White spots of various sizes are especially distinct near the margins of the carapace. On the anterior half of the first abdominal somite rather large white spots are visible; such spots are also present on the abdominal pleurae, the one near the articulation with the previous somite being especially conspicuous. The dorsal surface of the abdominal somite is spotted with minute dots, which (especially in the median region) are so inconspicuous that they escape a cursory examination; only along the posterior margin of the somites these dots form a more or less conspicuous, usually single row; the posterior margin itself is of a dark red or purplish colour. On the sixth somite the dots are more distinct than on the preceding. The calcified parts of the tail fan show quite large whitish spots similar to those of the abdominal pleurae. The upper surface of the antennular peduncle is streaked, that of the antennal peduncle is spotted. The legs show alternating whitish and purplish longitudinal streaks on the dorsal surface of merus, carpus, and propodus.

Type locality. Brazil.

Distribution. The species has been reported from Bermuda, Florida, Cuba, Jamaica, Curaçao, French Guiana, and Brazil. It seems to be the most common species of Spiny Lobster in Brazil, while it is rather rare in the other localities. It has not been reported before from Suriname.

### ***Panulirus guttatus*** (Latreille, 1804) (text fig. 20)

*Squilla, Crangon, Americana, altera* Seba, 1761, p. 54, pl. 21 fig. 5.

Description. Gruvel, 1911, p. 29, textfig. 12, pl. 3 fig. 3.

Remarks. Seba (1761) described and figured a species of *Panulirus* of which he stated "Elle vient aussi de Surinam". The description gives hardly any useful information on the species, but the figure is good and judging by the fact that the antennular plate shows only two spines and that the abdominal somites have straight uninterrupted grooves, the species has to be assigned to *Panulirus guttatus* (Latreille), the only East American species showing these characters. The identity of Seba's specimen with *Panulirus guttatus* has been recognized by practically all authors, and even Latreille

(1804, p. 392) in the original description of the species refers to Seba's figure.

Latreille's original description is short but clear. It mentions the presence of two spines on the antennular plate, the grooves on the abdominal segments, and the spotted colour pattern of the body. The fact that Latreille in this description refers to previous authors (Fabricius, 1798, Linnaeus, 1764,

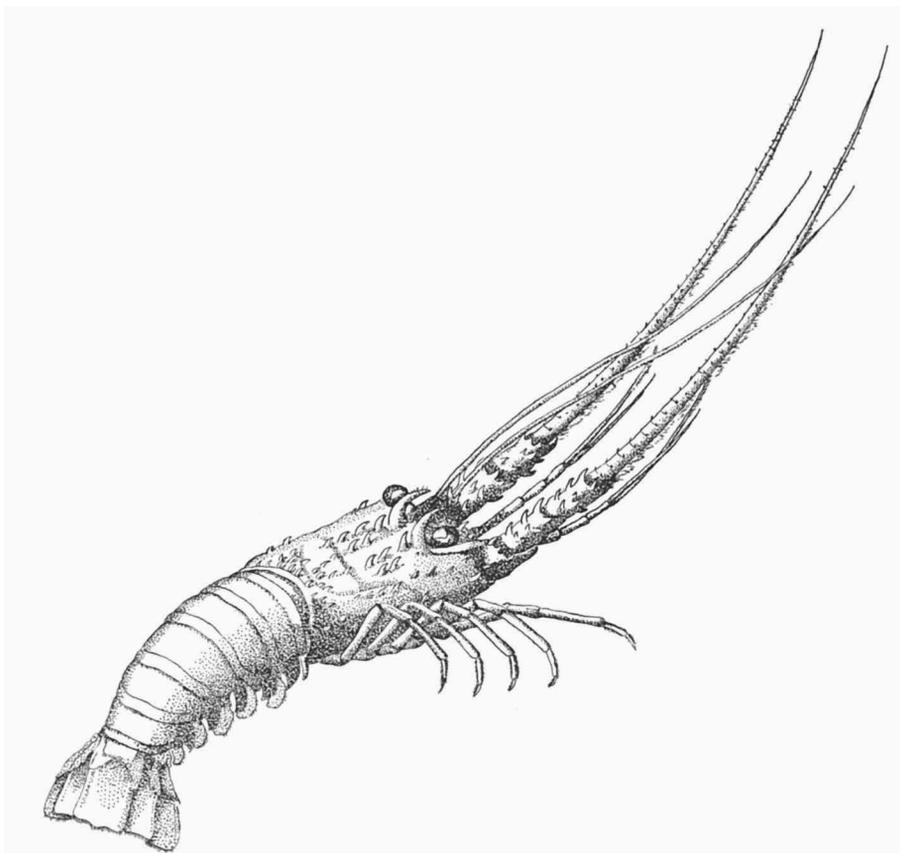


Fig. 20. *Panulirus guttatus* (Latreille). Specimen from Suriname. After Seba, 1761.

Linnaeus, 1767, Herbst, 1793, and Seba, 1761), who deal with different species, makes *Palinurus guttatus* Latreille a composite species. Fabricius's (1798, p. 400) record is based on material of *Panulirus homarus* (L.), *P. laevicauda* (Latr.), *P. guttatus* (Latr.) and *Palinurus elephas* (Fabr.). Linnaeus's (1764, p. 457) *Cancer Homarus* is a species dubia, his 1767 record is based on *Jasus lalandei* (H. Milne Edw.), *Panulirus laevicauda* (Latr.), *P. homarus* (L.), and *P. guttatus* (Latr.). Herbst (1793, pl. 31 fig. 1)

figured *Panulirus ornatus* (Fabr.), while Seba's specimen, as shown above, is *Panulirus guttatus* (Latr.). In order to definitely establish the identity of *Palinurus guttatus* Latreille, 1804, in harmony with current usage, I select now as its lectotype the specimen figured by Seba (1761, pl. 21 fig. 5).

Type locality. Latreille (1804, p. 393) gave as the locality of the species "les mers des Grandes-Indes", evidently meaning the Indian Ocean. Through the above type selection the erroneous type locality is now corrected to Suriname.

Distribution. Western Atlantic Ocean from Bermuda and Florida (U.S.A.) to Brazil and the West Indies. Apart from Seba's record the species has not been reported from Suriname.

#### Family Scyllaridae

#### *Scyllarus americanus* (Smith, 1869)

##### Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 27 m; 29 April-3 May 1957; fifth voyage. — 1 female. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 1 male, 1 female. (L)

Station 3, off the mouth of the Suriname River, 6° 24' N 55° 05' W; bottom shells; depth 27 m; 11 May 1957. — 1 male, 1 female. (L)

Station 4, off the mouth of the Suriname River, 6° 25' N 55° 05' W; depth 29 m; 11 May 1957. — 3 males, 2 ovigerous females. (L)

Station 8, off the mouth of the Suriname River, 6° 24' N 55° 02.5' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 female. (L)

Station 33, N.E. of the mouth of the Suriname River, 6° 52' N 54° 53' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 female. (W)

Station 279, between the mouths of the Coppename and Suriname Rivers, 6° 44' N 55° 33' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 1 female. (W)

Station 281-282, between the mouths of the Coppename and Suriname Rivers, 6° 46' N 55° 36.5' W and 6° 46.5' N 55° 38' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 1 male, 3 females. (W)

Station 283, between the mouths of the Coppename and Suriname Rivers, 6° 47' N 55° 40' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 2 males, 1 female. (L + W)

Station 286, N.E. of the mouth of the Coppename River, 6° 51' N 55° 49' W; bottom mud, sponges and shells; depth 48 m; 26 June 1957. — 1 male. (L)

Station 287, N.E. of the mouth of the Coppename River, 6° 52' N 55° 50' W; bottom mud, shells and coral; depth 48 m; 26 June 1957. — 1 male. (W)

Station 289, N.E. of the mouth of the Coppename River, 6° 52.5' N 55° 53' W; bottom mud and fine shells; depth 49 m; 27 June 1957. — 1 male, 1 female. (L)

Station 290, N.E. of the mouth of the Coppename River, 6° 53' N 55° 55' W; bottom mud, shells and coral; depth 49 m; 27 June 1957. — 1 male. (L)

Station 304, N.W. of the mouth of the Coppename River, 6° 57' N 56° 18' W; bottom mud and shells; depth 53 m; 7 July 1957. — 1 male, 1 ovigerous female. (L)

Station 334, between the mouths of the Coppename and Suriname Rivers, 6° 50' N 55° 22' W; bottom sand; depth 53 m; 20 July 1957. — 1 male, 1 ovigerous female. (W)

Station 337, off the mouth of the Suriname River,  $6^{\circ} 49' - 6^{\circ} 47' N$   $55^{\circ} 21' - 55^{\circ} 18' W$ ; bottom mud and fine shells; depth 49-53 m; 21 July 1957. — 2 males, 1 ovigerous female. (W)

Off Suriname. — 6 males, 5 females (4 ovigerous). (W)

Description. Bouvier, 1925 p. 447, textfigs. 14-16, pl. 7 fig. 3.

Remarks. The males are 24 to 47 mm long, the females 26 to 53 mm. The ovigerous females measure 38 to 53 mm.

Colour. In some specimens traces of the original colour pattern are still visible. On the pereopods of these specimens there is a purple spot in the middle of the propodus, carpus and merus. Furthermore there are four dark spots, 2 submedian and 2 lateral, in the anterior half of the dorsal surface of the first abdominal somite. Dark brown hairs form a dark transverse band over the anterior part of the dorsal surface of the carapace. This band extends between the orbital ridges and is interrupted by the anterior median tooth of the carapace, while furthermore there are two almost circular light spots where the hairs are absent.

Type locality. Egmont Key, west coast of Florida, U.S.A.

Distribution. East coast of the U.S.A. (North and South Carolina, Florida), the eastern Gulf of Mexico, the West Indies (Cuba, Vieques, St. Thomas, Flanagan Passage, Guadeloupe), and Brazil (Cape S. Roque). The species is now reported for the first time from Suriname.

### **Scyllarides americanus** Verrill, 1922 (pl. III fig. 2)

#### Coquette Investigations

Station 250, between the mouths of the Coppename and Suriname Rivers,  $6^{\circ} 41' N$   $55^{\circ} 26.5' W$ ; bottom mud, shells and coral; depth 42 m; 19 June 1957. — 1 male.

Description. Verrill, 1922, p. 24, pls. 5,6.

Remarks. The specimen, a male, is 150 mm long. Its carapace has a length of 63 mm, with a maximum breadth of 56 mm. The anterior breadth of the carapace is 54 mm. The lateral margins are slightly constricted behind the eyes. The antero-lateral angles are acute and directed somewhat forwards. The orbits are open at the ventral side; a tooth of the basal segment of the antenna fills part of the opening. The inner margin of the orbit shows three teeth. The carapace is more uneven than in *Scyllarides aequinoctialis* (Lund). In the median line before the cervical groove there are two elevations, one at the level of the posterior margin of the orbits, the other more posteriorly. The anterior elevation bears two submedian tubercles, the posterior elevation shows a single median tubercle. A longitudinal row of several tubercles extends over each branchial region. The surface of the carapace consists of numerous closely placed bluntly topped granules which are more elevated

than in *Scyllarides aequinoctialis*. In the abdomen these granules are very similar to those of the just named species. There is no median carina on any of the abdominal somites, only a slight median elevation may be observed. The first abdominal somite has the pleurae ending in a broad anterior lobe and a narrow posterior tooth. The pleurae of the second somite are broad and end in a posteriorly directed tooth; on the anterior margin two or three large teeth and several small ones are visible, the posterior margin bears one large and several small teeth. The pleurae of the third somite are truncated, the top bears three teeth, the two anterior are separated from the posterior by a distinct gap. The fourth and fifth somites have the pleurae ending in two blunt teeth, the anterior of which is broader than the posterior.

In the distal part of its outer margin the last segment of the antenna shows a distinct angle. The penultimate segment ends in an acute antero-lateral angle; the outer margin of the segment shows two broad and some small teeth, the anterior margin bears a distinct tooth.

The propodi of the first legs are short and high with a distinct dorsal carina. The carpus possesses an antero-dorsal tooth. The anterior margin of the merus shows several teeth, the strongest being the antero-dorsal, which forms the end of the dorsal carina. In the second leg the carina of the propodus is absent. In the following pereopods the dorsal carina is very distinct, while also a lateral carina is visible on the outer surface of the propodus. The carpus of the second to fifth legs possesses a dorsal carina which ends in an antero-dorsal tooth, while in the third to fifth legs an additional tooth is visible in the proximal half of the carina. In these legs a lateral carina is present on the outer surface of the carpus. The merus of the second to fifth legs possesses a very high dorsal carina, which ends in a strong tooth. The outer lower margin of the merus in the second leg is smooth, in the third it is slightly denticulate, and in the fourth and fifth it shows a strong tooth behind which the margin is denticulate. The ischium of the fifth legs shows a lateral spur.

The sternites of the second to fifth abdominal somites are finely denticulate.

Colour. The preserved specimen still shows a distinct colour-pattern. On the carapace behind the cervical groove there are four submedian red spots, which form a quadrangle. The anterior two of these spots are placed immediately behind either end of the short transverse median section of the cervical groove. The colour pattern of the first abdominal somite, which is of a high systematic value in this genus, is as follows: In the middle there is a large circular red spot, while halfway between this spot and the base of each pleura a smaller spot of a more triangular outline is visible. On the

anterior part of the second somite (and much less distinctly also on that of the following somites) a median red spot may be seen. The eyestalks show several longitudinal red bands. There are traces of a red banding on the legs, each of the meri, carpi, and propodi showing such a transverse band.

The present specimen agrees in most details, though not all, with Verrill's description of *Scyllarides americanus*. In my opinion one of the most important points of resemblance is the coloration of the first abdominal somite, which in the genus *Scyllarides* often serves as an easy means to distinguish two related species. The main difference is that in the Suriname specimen the surface of the carapace and the abdomen is far less rough than in the type specimen, while there are no median carinae on the abdominal somites.

The specimen described by Verrill (1922) had the carapace 110 mm long, being almost twice as long as the specimen now under consideration. It is possible, therefore, that the differences between Verrill's description and our specimen are only due to age. On the other hand, Verrill also had a specimen with cl. 75 mm, of which he gave some measurements, but no description. It is not precluded that this specimen lacked the abdomen as Verrill in his table of measurements only indicated the length of its carapace and did not give the total length.

As the present Suriname specimen possibly is not fully adult, it seems better to assign it provisionally to Verrill's species, in the hope that more and fullgrown material will finally determine the systematic position of the Suriname species.

Type locality. Bermuda.

Distribution. Bermuda, U.S.A. (Savannah, Georgia, and Cape Canaveral and off Pensacola, Florida), Cuba.

***Scyllarides aequinoctialis*** (Lund, 1793)

and

***Parribacus antarcticus*** (Lund, 1793)

These two species were reported by Neumann (1878, pp. 33 and 34, respectively) from Suriname under the names of *Scyllarus aequinoctialis* and *Ibacus antarcticus*. As already pointed out (p. 14), the specimens on which these records are based probably do not originate from Suriname but from the West Indian Islands.

Section Thalassinidea

Family Callianassidae

***Callianidea typa*** H. Milne Edwards, 1837

This species was reported from Suriname by Neumann (1878, p. 34). On p. 14 it has been emphasized that this and similar material mentioned by Neumann from Suriname

probably is incorrectly labelled and may actually come from the West Indian Islands. In the latter case the correct name for Neumann's specimens might be *Callianidea laevicauda* Gill, *C. typha* being an Indo-West Pacific species.

Suborder Anomura

Section Paguridea

Family Paguridae

Subfamily Diogeninae

**Paguristes depressus** Stimpson, 1859

Coquette Investigations

Station 29, N.E. of the mouth of the Suriname River, 6° 49' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 3 specimens. (L)

Station 30, N.E. of the mouth of the Suriname River, 6° 49.5' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 1 specimen. (W)

Station 32, N.E. of the mouth of the Suriname River, 6° 51' N 54° 53.5' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 specimen. (W)

Station 275, between the mouths of the Coppename and Suriname Rivers, 6° 41' N 55° 29' W; bottom shells and coral; depth 42 m; 25 June 1957. — 1 specimen. (W)

Station 279, between the mouths of the Coppename and Suriname Rivers, 6° 44' N 55° 33' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 1 specimen. (L)

Station 280, between the mouths of the Coppename and Suriname Rivers, 6° 45' N 55° 35' W; bottom mud and fine shells; depth 48 m; 26 June 1957. — 1 specimen. (W)

Station 306, N.W. of the mouth of the Coppename River, 6° 54' N 56° 14' W; bottom shells and coral; depth 49 m; 7 July 1957. — 1 specimen. (W)

Description. Benedict, 1901, p. 144, pl. 4 fig. 5.

Remarks. The carapace lengths of the specimens examined vary between 5 and 15 mm. They were found in the following Gastropods: *Distorsio* (*Rhysema*) spec. (Sta. 280), *Conus* spec. (Sta. 30, 279, 306). The specimens inhabiting *Conus* shells have the body strongly flattened, other specimens are of a more normal type. The smallest specimen (cl. 5 mm, Sta. 275) could not be identified with complete certainty.

As a rule in my specimens the base of the ophthalmic plates is broader than shown in Benedict's figure of this species. Several of the granules of the upper surface of the palm have minute horny tips. The tips of the fingers are black and pointed. The outline of the chelae is triangular, being broad at the base and regularly tapering towards the tips of the fingers.

Type locality. "In a *Strombus pugilis* dredged in two fathoms, sandy bottom, at the island of St. Thomas" (Stimpson, 1859, p. 88).

Distribution. Puerto Rico, St. Thomas. The species is now reported for the first time from Suriname.

**Paguristes tortugae** Schmitt, 1933 (textfigs. 21, 22a)

## Coquette Investigations

Station 23, N.E. of the mouth of the Suriname River, 6° 24' N 54° 59.5' W; bottom shells; depth 27 m; 12 May 1957. — 6 specimens (1 ovigerous). (L + W)

Station 26, N.E. of the mouth of the Suriname River, 6° 40' N 54° 58' W; bottom shells; depth 37 m; 12 May 1957. — 1 specimen. (W)

Description. The anterior shield of the carapace is much longer than broad. Some spinules are to be seen in the antero-lateral parts of the carapace. The rostrum is well developed, tongue-shaped with an acute point; it reaches beyond the base of the eyestalk. The lateral teeth end in a small spinule. The lateral margin of the rostrum and the anterior margin of the carapace between the lateral teeth is distinctly raised and is curved backwards between the rostrum and the teeth.

The eyes are rather slender, but their length is less than  $\frac{3}{4}$  of the anterior breadth of the carapace. The cornea is rounded at the top, it is slightly broader than the end of the stalk, and shows only an indistinct shallow posterior emargination. Some hairs are implanted on the dorsal surface of the eyestalk. The ophthalmic plates practically touch the rostrum; they have a broad base. The inner part of the plates is produced anteriorly to a slender process, which reaches distinctly beyond the tip of the rostrum and ends in two or three (sometimes four) sharply pointed teeth.

The antennular peduncle reaches beyond the eyes with less than half the distal segment, at least in my Suriname specimens; in Florida specimens it fails to reach the cornea. The antennal peduncle in my Suriname material almost attains the base of the cornea, in the Florida specimens examined it reaches about  $\frac{2}{3}$  of the length of the eyestalk. The basal segment of the antennal peduncle shows a small antero-external spinule. The second segment possesses a distinct antero-internal spine, while the antero-external angle is produced forwards to a distinct process which ends in a sharp tooth; the outer margin of the segment (including that of the process) bears three to five teeth. The scaphocerite is slender and almost reaches the end of the last segment of the antennal peduncle; the outer margin bears three or four teeth, while on the inner margin one (in Florida specimens) or two (in Suriname specimens) teeth are present in the basal part. No spines are visible on the ultimate segment of the peduncle.

The chelipeds are equal and thickly covered with hairs. The upper margin of the palm bears a row of two or three sharply pointed teeth. The outer surface of the propodus bears numerous low tubercles, which have a small sharp anteriorly directed horny tip. The hairs are implanted along the anterior part of the base of the tubercles; hereby the chela obtains a squamose

appearance. In its upper part the outer surface of the dactylus bears about seven more or less distinct transverse rows of small horny-tipped tubercles,

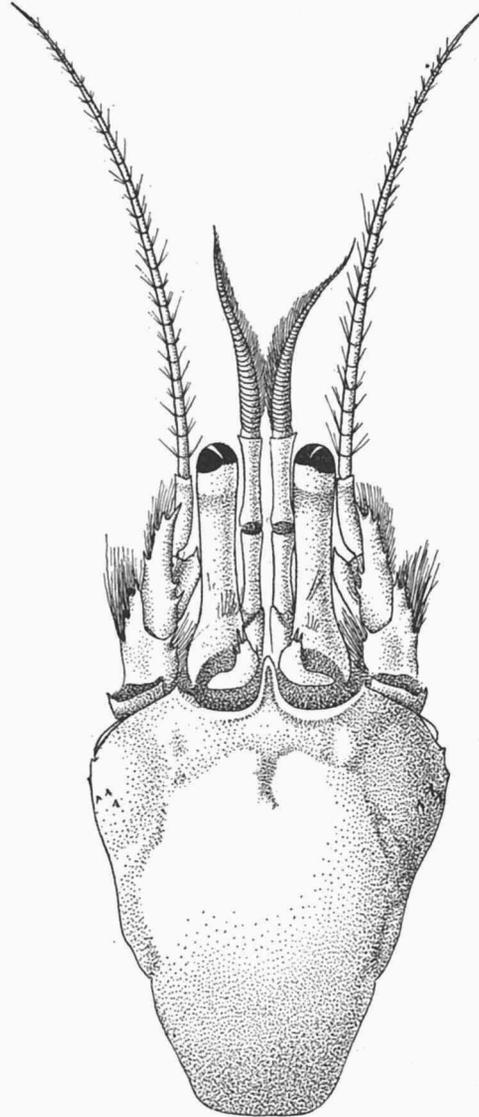


Fig. 21. *Paguristes tortugae* Schmitt. Anterior part of body in dorsal view. Specimen from "Coquette" Sta. 23.  $\times 10$ . H. Heijn del.

those on the upper margin being largest. The fingers have the cutting edges ending in distinct black hoofs, behind which there are several small teeth.

The lower surface of the chela, apart from some tufts of hairs, is smooth. The upper margin of the carpus bears five teeth, all or part of which have a sharp horny tip. The outer surface of the carpus bears squamiform tubercles which may end in sharp horny tips. The lower margin of the outer surface is sometimes indicated by a row of larger tubercles. Near the articulation with the chela the outer surface sometimes shows a tubercular thickening. A small antero-ventral spine is present. The merus has one or two (in Suri-

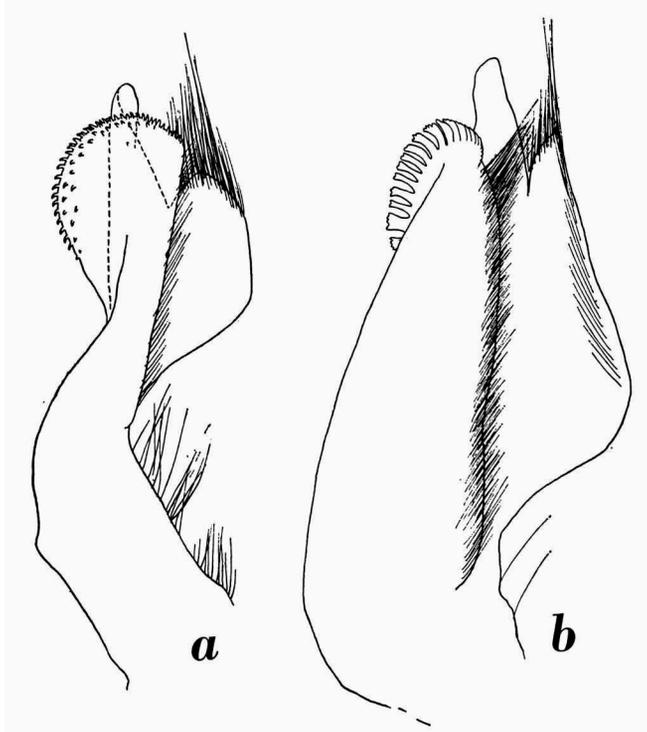


Fig. 22. First pleopod of male. a, *Paguristes tortugae* Schmitt; b, *Paguristes oxyphthalmus* new species. a, b,  $\times 50$ .

name specimens) or three or four (in Florida specimens) small antero-dorsal spines. The lower inner margin bears a longitudinal row of spinules; the lower outer margin shows some granules and an anterior tooth. The walking legs reach with about the dactylus beyond the chelipeds. Both upper and lower margins of these legs bear an uninterrupted row of long hairs, while some tufts are also present on the lateral surfaces. The dactyli are somewhat longer than the propodi, the tip is of a dark horn colour, while small spinules of the same colour are placed in a row on the ventral margin of the dactylus. The inner surface of the dactylus and propodus of both walking legs shows

near the upper and lower margin a squamiform sculpturation, which is the more pronounced as the implantations of the hairs coincide with the squames, which furthermore have small horny spinules placed on their margins. The upper part of the inner surface of carpus, propodus, and dactylus of the second leg shows a shallow longitudinal groove. The outer surface of both walking legs is smooth with one or two longitudinal rows of tufts of short hairs. The upper margin of the dactylus of the second pereopods (= first pair of walking legs) bears some denticles in the basal region; these denticles have tips of a horny yellow colour. The upper margin of the propodus of that leg is distinctly serrate, the teeth being horny tipped. In the third pair of pereopods (= second pair of walking legs) neither the dactylus nor the propodus bears dorsal spines, only the minute spinules on the squames being visible. The carpus of the second pereopods has two rows of spines dorsally (one on the upper margin and one in the upper part of the inner surface), while only one such row is present in the carpus of the third legs. The merus bears a sharp antero-ventral spine in both the second and third legs; in the third leg a row of spinules may be present on the dorsal margin, while it is not found in the second leg. A small outer antero-ventral tooth is present on the meri of both legs, while the second sometimes has the lower margin of the merus with a row of small spinules.

The top of the lower blade of the first pleopod of the male is broadly, almost circularly rounded, and is provided with many short, often recurved, horny spinules. The distal lobe is blunt and reaches beyond the lower blade, the inner lobe is rather short and narrow.

Colour. In my preserved specimens the carapace shows no colour markings at all. The distal part of the eyestalks bears a red ring, which is separated from the cornea by a whitish ring; the rest of the eyestalk is of a pale pinkish colour, while sometimes an indication of a red ring may be observed in the basal part. The distal two segments of the antennular peduncle both have in their distal part a red ring, which is separated from the anterior margin by a whitish ring; a second red ring is visible in the proximal half of the distal segment. The last segment of the antennal peduncle shows a red ring slightly behind the anterior margin. The thickened part of the upper antennular flagellum is pinkish, becoming paler distally. The antennal flagella show red rings. The legs are rather uniformly pinkish.

The specimens from Sta. 23 inhabited the shells of the following Gastropod species: *Bursa (Bursa) spadicea* (Montf.) (3 specimens), *Murex (Murex) spec.* (1 specimen), *Thais (Stramonita) haemastoma floridana* (Conrad) (3 specimens).

Remarks. The present Suriname specimens, which have the cl. varying

between 4 and 8 mm (6 mm in the ovigerous female), were directly compared with three specimens (cl. 13 to 15 mm) from Tortugas, Florida (July 1925, H. Boschma; Leiden Mus. Reg. No. Crust. D 12587). The differences between the Suriname and Florida specimens have already been mentioned in the above description. They are so slight that, for the time being at least, the specimens are considered conspecific. In Schmitt's (1935) drawing of this species the spinules on the antennae and the walking legs are not shown, while also the characteristic squamiform sculpturation of these legs is omitted.

Type locality. Off Fort Jefferson dock, Garden Key, Dry Tortugas, Florida, U.S.A.; interstices of large *Porites* clumps.

Distribution. The species was only known from Florida (U.S.A.) and Puerto Rico; it is now reported for the first time from Suriname.

**Paguristes oxyophthalmus** new species (textfigs. 22b, 23)

Coquette Investigations

About 20 miles N.N.W. of the mouth of the Coppename River; depth 31 m; 1-5 April 1957; first voyage. — 1 ovigerous female. (L)

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 27 m; 29 April-3 May 1957; fifth voyage. — 1 male. (L)

Station 20, N.E. of the mouth of the Suriname River, 6° 28' N 54° 57.5' W; bottom shells; depth 31 m; 11 May 1957. — 1 male. (L)

Station 28, N.E. of the mouth of the Suriname River, 6° 48' N 54° 54' W; bottom shells; depth 46 m; 12 May 1957. — 1 male. (W)

Station 32, N.E. of the mouth of the Suriname River, 6° 51' N 54° 53.5' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 male. (L)

Station 274, between the mouths of the Coppename and Suriname Rivers, 6° 41' N 55° 27' W; bottom shells and coral; depth 42 m; 25 June 1957. — 1 male. (W)

Description. The carapace lengths of the specimens vary between 4 and 8 mm, in the ovigerous female it is 6 mm. The anterior shield of the carapace is about as long as broad. It is provided with some tufts of hair, while in the lateral parts there are about three transverse rows of spinules. The anterior of these rows is longest and lies a short distance behind the anterior margin of the carapace, laterally it curves backwards; the spinules of the two other rows are smaller and fewer. A longitudinal row of spinules is present on the largest of the lateral plates of the carapace. The rostrum is very short, broad and blunt; it fails to reach as far as the bases of the lateral teeth. Each of the latter ends in a distinct, though small, acute spinule.

The eyes are slender but are distinctly shorter than the anterior breadth of the carapace. The cornea is narrow and tapers anteriorly to a blunt point. It is about as long as broad and in the inner dorsal part of the basal margin it shows a very deep triangular emargination. The ophthalmic scales are

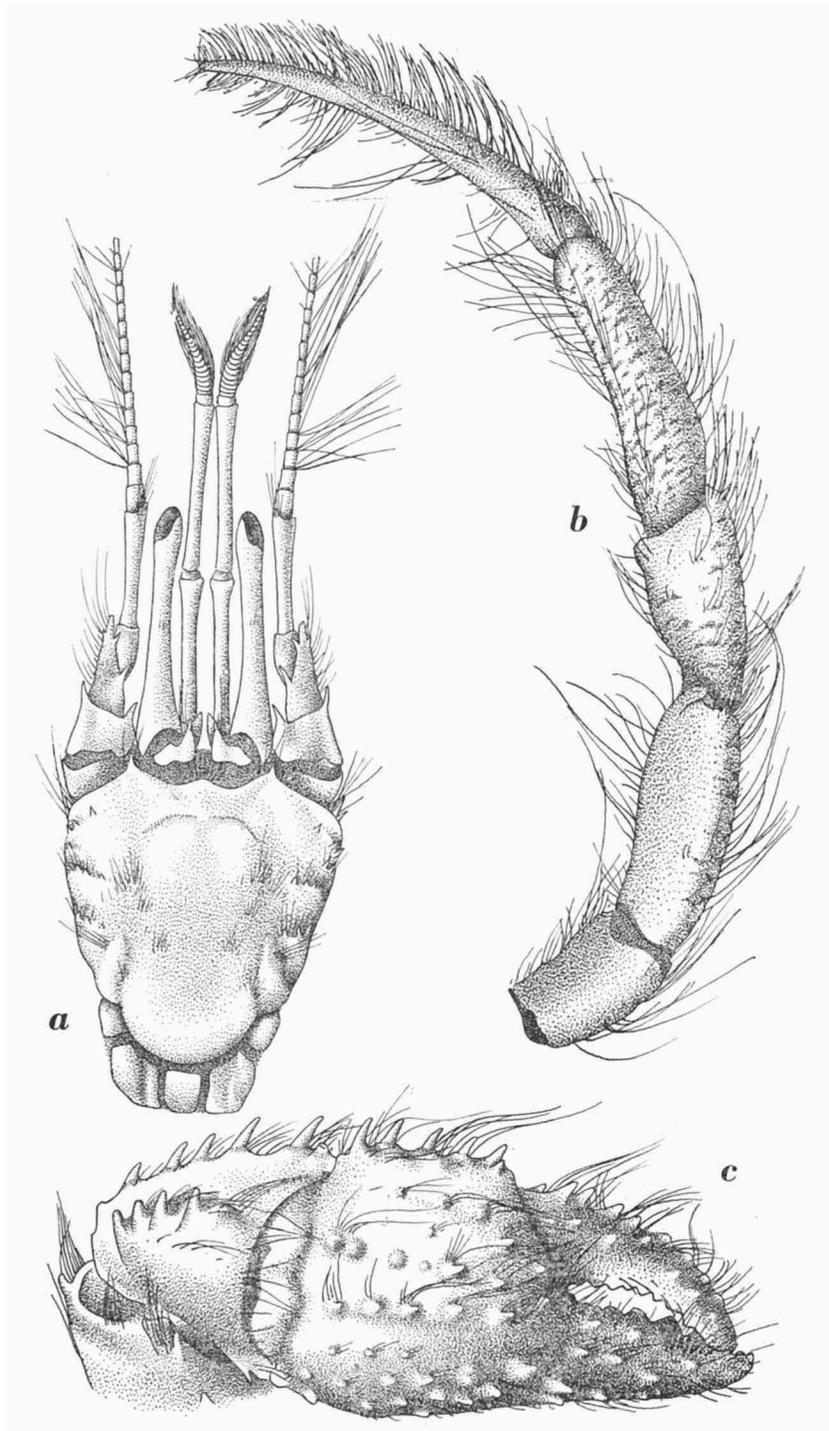


Fig. 23. *Paguristes oxyophthalmus* new species. a, anterior part of body in dorsal view; b, cheliped; c, third pereopod. a-c,  $\times 10$ . H. Heijn del.

separated by a narrow space; they are broad at their base; the inner part is produced forwards to a simply pointed process which reaches slightly beyond the base of the eyestalk.

The antennular peduncles reach beyond the eyes with about half the length of the ultimate segment. The antennal peduncle reaches only slightly beyond the eyes. The scaphocerite reaches somewhat beyond the base of the ultimate segment of the peduncle and on its inner margin it bears two or three teeth. The second segment of the peduncle shows two spines on the anterior margin, one on each side of the base of the scaphocerite, the outer being stronger than the inner. The ultimate segment of the peduncle is slender and bears no spines.

The chelipeds are equal and are thickly covered by long hairs. The upper margin of the palm bears a row of five strong teeth. The outer surface is smooth but for three or four longitudinal rows of tubercles, each of which is surrounded by long hairs. Similar tubercles are visible on the fingers. The cutting edges of the fingers end in a small black tip and are provided with about 10 teeth of different size. The inner surface of the palm is convex and shows several blunt tubercles, one or two of which are conspicuously larger than the rest. The carpus bears two longitudinal rows of strong spines, one on the dorsal margin, the other over the outer surface. The merus ends in an antero-dorsal spine, behind which there is a smaller second spine. The lower outer margin bears a row of spines which increase in size anteriorly; a row of smaller spines is present on the lower inner margin. The walking legs reach with part of the dactylus beyond the chelipeds; they are clothed with long hairs, especially on the dorsal and ventral margins. The dactylus is distinctly longer than the propodus. The lower margin of the propodus bears some blunt tubercles. The propodus of the second leg has a longitudinal row of about 4 spines in the proximal half of the upper margin; no such spines are present in the propodus of the third leg. The carpus of the second leg has a row of dorsal spines, that of the third possesses a single antero-dorsal spine only. In both legs the merus shows some dorsal tubercles.

The lower blade of the first pleopod of the male bears at the end a crown of spinules, which as a rule are rather broad at the top, ending in two or more teeth. The distal lobe is blunt and reaches beyond the lower blade. The inner lobe is rather narrow but reaches almost to the end of the lower blade.

Colour. In my preserved material a few faint reddish spots are visible on the carapace, while a very small red spot is present in the basal part of the eyestalks. In the chelipeds there is a red band over the base of the palm. A red band extends along the external and posterior margin of the upper surface of the carpus and continues on the basal part of the inner surface;

a red spot is visible in the antero-internal part of the dorsal surface of the carpus. The merus has a red distal band and shows a red colour in the upper basal part. The walking legs show a red band in the basal and in the distal part of the propodus, carpus and merus, and furthermore in the basal part of the dactylus.

Remarks. The species is to be distinguished from all other known West Indian species of the genus by the narrow tapering cornea. In the long antennula and the short rostrum it comes closest to *Paguristes sayi* A. Milne Edwards & Bouvier and *P. lymani* A. Milne Edwards & Bouvier, from both of which it may immediately be distinguished by the simply pointed ophthalmic scales.

Type. The specimen collected during the first voyage of the "Coquette" is the holotype. It is inserted in the collection of the Leiden Museum under Reg. No. Crustacea D 12586.

**Paguristes erythropros** new species (textfigs. 24, 25)

Coquette Investigations

Station 318, between the mouths of the Coppename and Suriname Rivers, 6° 42' N 55° 38' W; bottom mud and fine shells; depth 44 m; 20 July 1957. — 1 female. (L)

Description. The carapace length of the single specimen is 5 mm. The anterior shield of the carapace is longer than broad. The lateral parts show three transverse rows of spinules, while moreover a few spinules are present on the antero-lateral margin. The rostrum is broad, triangular, and ends in a minute acute point. It reaches beyond the bases of the ophthalmic plates. The lateral teeth of the anterior margin of the carapace are blunt, each ending in a minute point. The anterior margin between the lateral teeth and the rostrum is regularly concave. The lateral part of the anterior margin is directed obliquely backwards. Between the lateral teeth the anterior margin of the carapace and the margin of the rostrum are raised.

The eyes are distinctly shorter than the anterior breadth of the carapace. The cornea is broader than the distal part of the eyestalk and is rounded. It is broader than long and shows a distinct emargination in the dorsal part of its basal margin. The ophthalmic scales are separated by a distance which is equal to the basal breadth of the rostrum; the base of these scales is broad, the inner half is anteriorly produced to a simple sharply pointed triangle, without any lateral teeth or spines.

The antennular peduncle is about as long as the eye. The antennal peduncle reaches slightly beyond  $\frac{2}{3}$  of the length of the eyestalk. The scaphocerite falls only slightly short of the end of the peduncle. It bears two or three teeth on the outer margin, none on the inner, while two are present on the

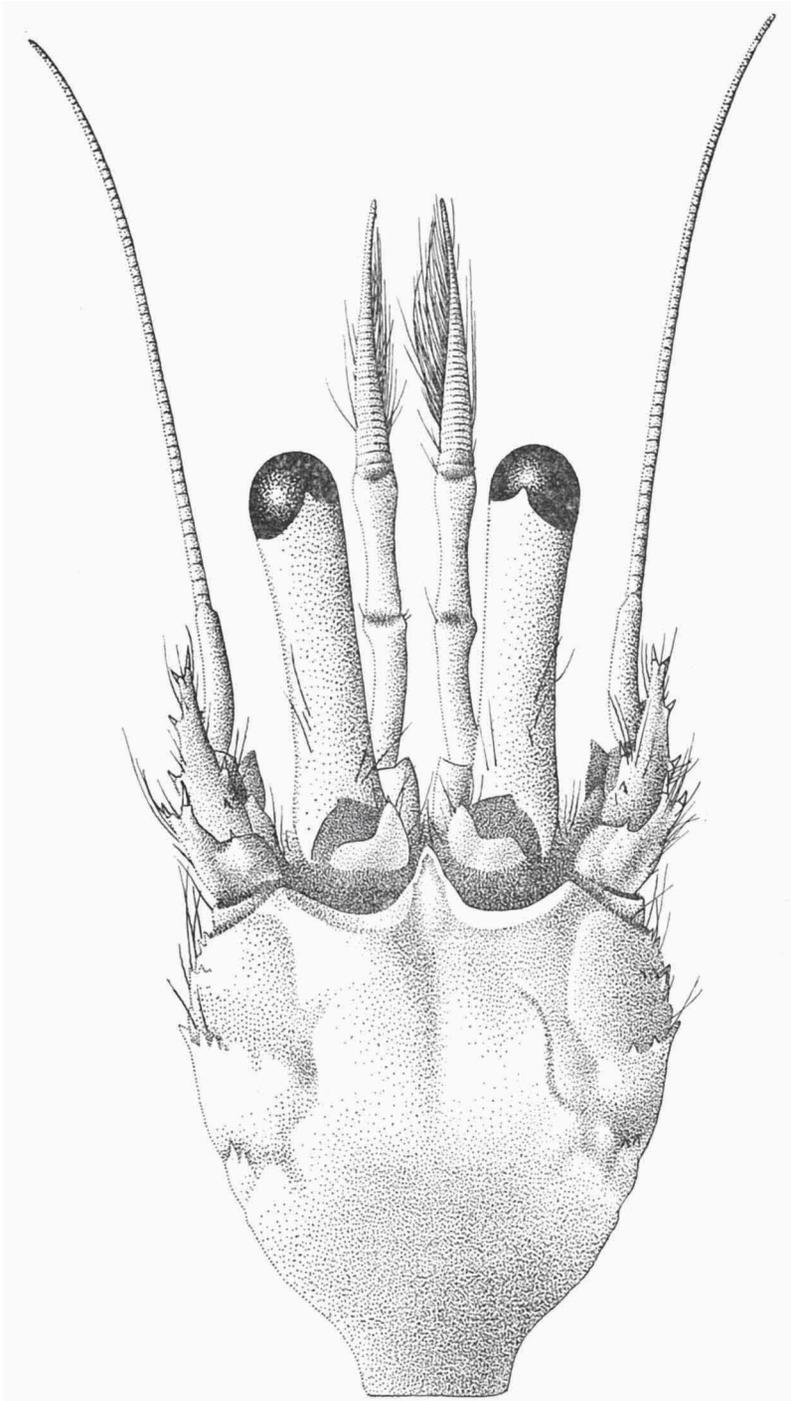


Fig. 24. *Paguristes erythropus* new species, holotype. Anterior part of body in dorsal view.  $\times 18$ . H. Heijn del.

upper surface; the anterior of the latter two is larger than the posterior. The second segment of the peduncle has a small dorsal spinule on the anterior margin, at the base of the scaphocerite, while the outer antero-lateral angle is strongly produced and ends in two sharp equal teeth. The last segment of the peduncle shows two spines in the basal part of the outer margin.

The chelipeds are equal and have only short hairs. The upper margin of the palm bears four strong, broad, but short spines, which have the tips acute and curved forwards. The outer surface of the chela is rather regularly covered with tubercles of various sizes, which usually end in sharp horny

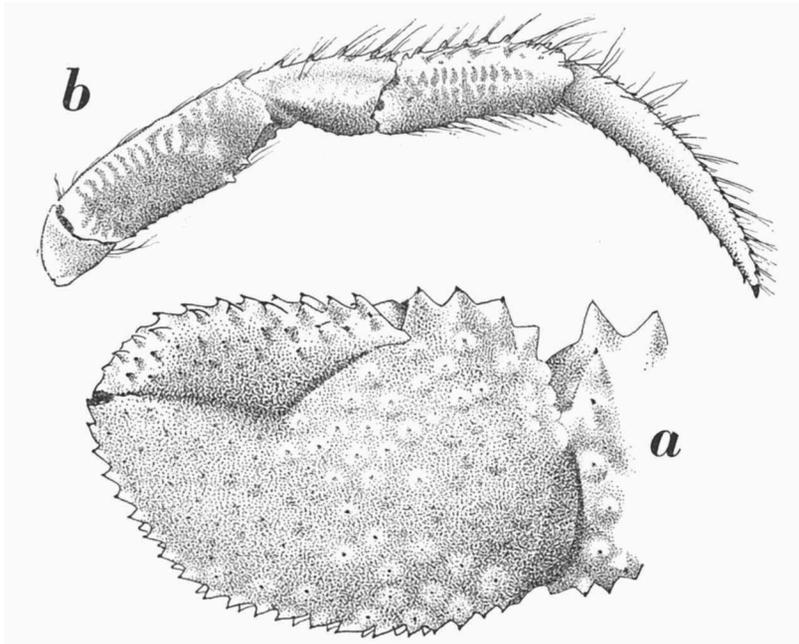


Fig. 25. *Paguristes erythrops* new species, holotype. a, cheliped; b, second pereiopod. a,  $\times 20$ ; b,  $\times 12$ . H. Heijn del.

tips. The lower margin of the chela is convex, the upper is about straight. Each finger ends in a small dark coloured hoof; the fixed finger is about twice as high as the dactylus. The inner surface of the chela also bears pointed tubercles, which, however, are far fewer than on the outer surface. The outer and lower surfaces of the carpus have tubercles similar to those of the chela. The upper margin of the carpus is provided with three strong spines, like those of the palm. The merus has a few spiniform granules in the upper part and a row of tubercles along both the lower outer and the lower inner margins; both margins end in a small tooth. The second leg

reaches with part of the dactylus beyond the chela. The dactylus is about 1.5 times as long as the propodus; its tip is of a dark horn colour; a row of minute spinules of a similar colour is present on the lower margin. The upper margin of the dactylus bears a longitudinal row of horn-tipped teeth, which are placed slightly inwards, and which are most distinct in the basal part. A broad longitudinal groove is present in the upper part of the inner surface of the dactylus, being most distinct proximally. The propodus possesses sharp teeth both on the upper and lower margin; the upper teeth, about 10 in number, are larger than the lower. The dorsal surface of the carpus shows two longitudinal rows of distinct, sharply pointed spines. The outer surface of the carpus bears some tubercles, one of which, situated near the anterior margin, is largest. The merus bears tubercles and spinules on both lower margins. In the third leg no teeth are visible on the dorsal margin of the dactylus, propodus and merus, though spinules are present on the lower margin of the former segment. The carpus bears an antero-dorsal spine and a few spinules on the outer surface.

Colour. In my preserved specimen the general colour is whitish or very pale pink. The eyestalks are strikingly carmine in colour, while the two distal joints of the antennular peduncle are of similar, though lighter tinge. Furthermore scattered small roundish red spots are present on the carapace and on the three anterior legs.

The specimen inhabited the shell of a Gastropod mollusc belonging to the genus *Fusinus*.

Remarks. In the shape of the eyes, the front, and the antennae the present new species shows a close resemblance to *Paguristes puncticeps* Benedict (with which in my opinion *P. grayi* Benedict may be synonymous). The two species may be separated by (1) the shape of the ophthalmic scales, which in *P. erythrops* do not show a lobe on the inner margin, (2) the spinulation of the legs, and (3) the totally different colour pattern.

Type. The specimen mentioned above is the holotype. It is preserved in the collection of the Leiden Museum under Reg. No. Crustacea D 12482.

***Clibanarius vittatus*** (Bosc, 1801-1802) (textfigs. 26, 27)

"een soort van Kreeften" Merian, 1705, 1719, p. 59; 1730, p. 43, pl. 59.

"species cancrorum" Merian, 1705a, 1719a, 1726, p. 59, pl. 59; 1771, vol. 1, p. 59, pl. 59.

"espèce d'Ecrevices" Merian, 1726, p. 59, pl. 59.

"espèce d'Ecrevisses" Merian, 1771, vol. 1, p. 59, pl. 59.

"a parasitic crab" Guilding, 1834, p. 373.

"Bernard l'Hermite" Teenstra, 1835, p. 443.

*Pagurus symmetricus* Randall, 1840, p. 133.

*Pagurus* Kappler, 1887, p. 200.

Paguridae Jentink, 1912, p. 14.

## Museum Leiden

Mouth of the Suriname River near Pomona; 22 December 1942; D. C. Geijskes. — 5 specimens.

Beach near Braamspunt, mouth of the Suriname River; 20 August 1911, W. C. van Heurn; 17 August 1948, D. C. Geijskes; 5 April 1957, L. B. Holthuis no. 1219. — 107 specimens (3 ovigerous).

Near Paramaribo; July 1911, W. C. van Heurn; February 1914, A. J. Schimmelpenninck van der Oye. — 88 specimens (7 ovigerous).

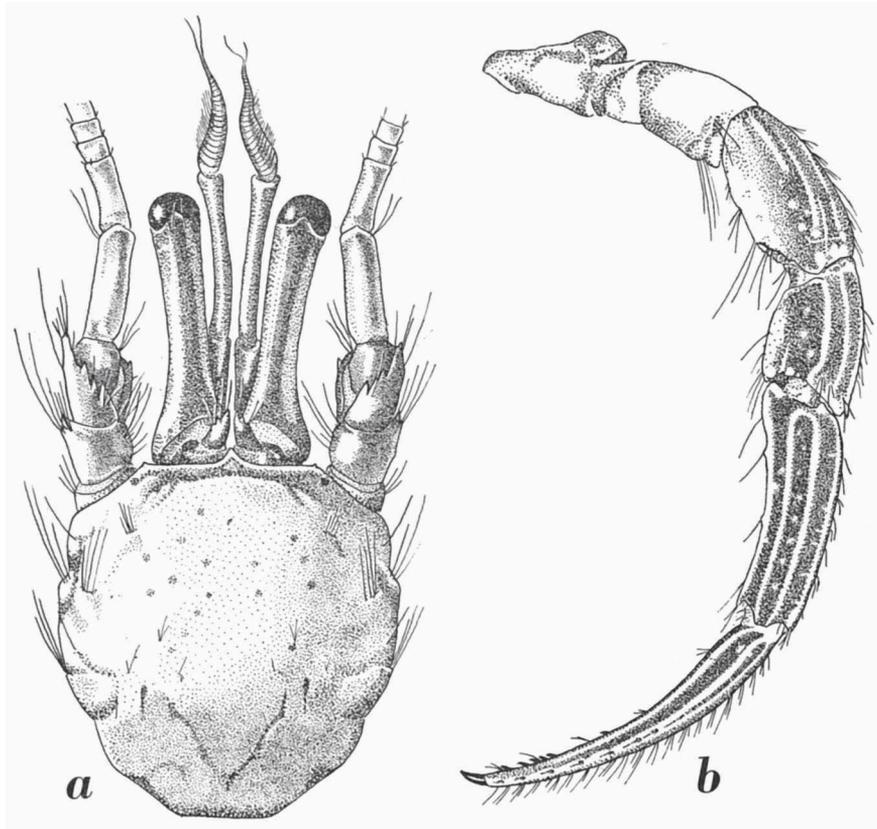


Fig. 26. *Clibanarius vittatus* (Bosc). a, anterior part of body in dorsal view; b, third pereiopod. Specimen from Braamspunt (L. B. Holthuis no. 1219). a,  $\times 1,6$ ; b,  $\times 3,2$ . W. C. G. Gertenaar del.

Beach near the mouth of the Matappica Canal; 7 May 1948, D. C. Geijskes; 6 April 1957, L. B. Holthuis no. 1222. — 11 specimens.

Suriname; 1910 and 9 June 1910; D. G. J. Bolten. — 9 specimens.

Suriname; 1901; 1901 Coppename Expedition. — 2 specimens.

Suriname. — 10 specimens.

## Museum Hamburg

Paramaribo; 1 September 1908; C. Heller. — 6 specimens.

Paramaribo; C. Heller; received 24 May 1909. — 8 specimens.

## Museum Philadelphia

Suriname; C. Hering. — 1 specimen. Holotype of *Pagurus symmetricus* Randall.

Description. The specimens have carapace lengths ranging between 7 and 30 mm. Ovigerous females, with cl. 7 to 15 mm, were found in the months of July and August.

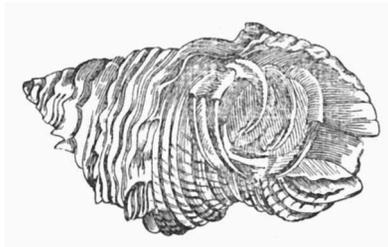


Fig. 27. *Clibanarius vittatus* (Bosc). Specimen from Suriname. After Merian, 1705.

The median part of the anterior margin of the carapace is straight, the lateral parts are directed obliquely backwards, forming a distinct obtuse angle with the median part. The rostrum is small, acute and triangular, reaching slightly beyond the bases of the ophthalmic scales. A distinct groove runs behind and parallel to the anterior margin; in its lateral part it gives off two branches which are directed more posteriorly. Tufts of hairs are implanted on the antero-lateral part of the carapace and behind the cervical groove.

The eyes are slender, measuring about  $\frac{5}{6}$  of the anterior breadth of the carapace. The cornea is small. The ophthalmic scales are triangular and have three spines in the distal part of the external margin.

The antennular peduncles reach beyond the eyes with a small part of their distal joint.

The antennal peduncle almost reaches the base of the cornea. The scaphocerite is triangular and reaches to or slightly beyond the base of the last segment of the peduncle. It bears four or five spines on the inner margin. A small spine is present in the basal part of the peduncle, just externally of the base of the scaphocerite.

The first legs are equal, reaching beyond the eyes with the carpus and the chela, sometimes with part of the merus. The chela is covered with many tubercles of various sizes, those on the fingers having the tips corneous, and

placed (especially on the dactylus) in more or less distinct longitudinal rows. The upper (= inner) margin of the palm bears a row of about four cornuously tipped tubercles. The inner (= lower) surface of the chela is strongly convex and bears tubercles similar to those of the outer surface, but of a more flattened shape. The cutting edges of the fingers bear a few blunt teeth, the distal of which is the largest. The tips of the fingers are provided with distinct black hoofs. Anteriorly the dorsal margin of the carpus ends in a tooth behind which there are some smaller denticles. The outer surface of the carpus shows some more tubercles. The merus has the lower inner margin granular. Two small teeth are present at the end of the lower outer margin. The second legs have the dactylus about 1.3 times as long as the propodus. It ends in a dark coloured tip; in its distal part the lower margin bears some dark coloured spines and it has tufts of hair over its entire length. Furthermore tufts of hair are arranged in longitudinal rows over the rest of the surface of the dactylus. The upper margin shows a blunt carina. The propodus is more or less cylindrical and bears scattered tufts of hair; the anterior margin sometimes shows one or two small spinules dorsally or internally. The carpus ends in one to three antero-dorsal teeth while the upper margin bears one to three teeth at some distance behind the anterior margin. Furthermore there may be one or two small spines in the external part of the anterior margin. The merus has the lower inner margin granular, the lower outer margin with a distal tooth. In the third legs the dactylus is relatively still longer than the propodus (almost 1.5 times). The general shape of the various segments of the third leg is similar to that of the segments of the second, only the carpus has a single antero-dorsal tooth, while the lower inner margin of the merus is not granular.

Colour. The legs are olive-green or brown. The tubercles on the outer surface of the chela are bluish white. The dactylus of the walking legs shows one longitudinal pale streak above and below, and two on each lateral surface. The propodus shows four pale longitudinal streaks on each surface. The carpus has one dorsal and two external streaks, while on the outer surface of the merus also two pale streaks may be seen. There is a dark longitudinal line on the dorsal surface of the eyestalk, flanked by two paler lines. The last segment of the antennal peduncle has a pale line on the dorsal surface.

The specimens inhabited a rather great variety of Gastropod shells: *Pomacea glauca* (L.) (1 specimen), *Natica canrena* (L.) (1 specimen), *Bursa spadicea* (Montf.) (9 specimens), *Murex chrysostoma* Sow. (6 specimens), *Thais* (*Stramonita*) *haemastoma floridana* (Conrad) (57 specimens), *Thais* (*Thais*) *trinitatensis* (Guppy) (27 specimens), *Melongena melongena* (L.) (2 specimens), *Pugilina morio* (L.) (27 specimens).

Remarks. The present species is closely related to *Clibanarius sclopetarius* (Herbst)<sup>1</sup>), from which it differs in the following points.

1. In *C. sclopetarius* the rostrum is rounded or truncate at the tip, in *C. vittatus* it is triangular and more acute.

2. In *C. sclopetarius* the eyestalks are longer than the anterior breadth of the carapace, in *C. vittatus* they are distinctly shorter than that breadth.

3. The last segment of the antennal peduncle is less than 2.5 times as long as broad in *C. vittatus*, more than 2.5 times in *C. sclopetarius*.

4. The dactylus of the walking legs in *C. sclopetarius* is dark above and below, the lateral surface showing only two broad longitudinal pale streaks. Also the propodus and carpus show two broad, light stripes on the external and internal surfaces. Three broad stripes are present on the external surface of the merus. The pale lines on the legs of *C. vittatus* are narrower and more numerous.

*Pagurus symmetricus* Randall, 1840, was described from Suriname and has been overlooked by most subsequent authors. The species is not even mentioned in Alcock's (1905) enumeration of the Paguridae of the world. Randall's description, for its time, is reasonably good, and there can be little doubt that he described the only Pagurid which is commonly found on the Suriname sea shore, where so far no other species of hermit crab has been observed. All the other Paguridae dealt with in the present paper were trawled at considerable distances from the coast.

My Suriname specimens of this species were directly compared with specimens of *C. vittatus* from Florida, which Mr. Marvin L. Wass kindly placed at my disposal. This made it possible for me to establish the specific identity of the two forms. Apart from the fact that in the Suriname material the light bands on the legs are relatively somewhat narrower, the Florida and Suriname specimens show a complete resemblance, both in form and in the colour pattern.

It seems most probable that Miers's (1877) new species *Clibanarius cayennensis* is identical with the present form and that it is based on a specimen in which one cheliped is regenerating and thereby shorter than the other, while the absence of any colour pattern probably is due to the method of preservation of the animal. The possibility exists that also *Clibanarius spe-*

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1) This species is often indicated with the name *Clibanarius cubensis* (De Saussure, 1858). As Mr. Marvin L. Wass, University of Florida, Gainesville, informed me in litt., there can be little doubt that De Saussure's species is identical with *Cancer sclopetarius* Herbst, 1791. I thank Mr. Wass for this information and for his permission to make use of it in the present paper.

*ciosus* Miers should be placed in the synonymy of the present species. An examination of Miers's types is most desirable.

Type locality. "Les côtes de la Caroline" (Bosc, 1801-1802, vol. 2, p. 79). The type locality of *Pagurus symmetricus* Randall, 1840, is Suriname.

Distribution. East coast of America from North Carolina (U.S.A.) to Brazil. Graham (1955, p. 35, pl. 5 fig. 4) described and figured this species from British Guiana as the "common Hermit Crab of Demarara", identifying it on p. 77 of her book with *Clibanarius cubensis*. The type material of *C. cayennensis* Miers originates from French Guiana.

Occurrence in Suriname. The species is the only hermit crab so far found on the Suriname shores. It is quite common on the beaches of sand or hard mud near the mouths of the rivers, where the specimens are mostly found close to the water line.

The first record of this species dates from 1705, when Merian published her book on Suriname Insects. Pl. LIX of this work shows a hermit crab, which was collected at the Suriname coast. Though the figure is not up to the standard of Merian's other illustrations, there can be little doubt that the present species is depicted. Merian's text gives no clue at all: "Ik heb ook laaten hoorntjes uit de grond der Zee opvissen, om te zien wat voor beestjens daar in zitten mogten, ik heb dan zeer veel gehad, daar de beestjens nog levendig in zaten, ik heb verscheide met geweld daar uit getrokken, en bevonden dat se van vooren een soort van Kreeften waren, maar van achter waren se Slakken in het hoorntje ingedraait, des daags lagen se stil, maar des nachts maakten se een stil geluid met haare pooten, en waren zeer onrustig." (I also had some shells fished for me from the sea, in order to find out what kind of animals inhabited them. I received many in which the animals were still alive. I pulled several out by force and found them to be a kind of lobster anteriorly, but posteriorly they were snails twisted into the shell. In the daytime they were quiet, but at night they made a soft noise with their legs and were very restless). Guilding (1834) in his comments on Merian's work remarked of her pl. 59: "The Pýrula, and another shell with a parasitic crab, are not worthy of mention." Teenstra (1835) reports the presence of a hermit crab in Suriname without giving any details. Kappler (1887, p. 200) spoke of "einigen Arten Einsiedlerkrebse, *Pagurus*, die auf den Sandbänken in angeschwemmten Schneckenschalen hausen" without stating whether he actually did recognize more than one species. Though *Clibanarius vittatus* is very common in Suriname, no modern author seems to have reported upon Suriname material.

***Clibanarius foresti*** new species (textfig. 28)

## Coquette Investigations

About 20 miles N.N.W. of the mouth of the Coppename River; depth 31 m; 1-5 April 1957; first voyage. — 9 specimens (4 ovigerous). (L)

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 specimen. (L)

Off the Suriname coast between the mouths of the Nickerie and Coppename Rivers, about 20 miles offshore; depth 27 m; 15-20 April 1957; third voyage. — 1 specimen. (L)

N.N.W. of the mouth of the Marowijne River, 20 miles offshore; depth 27 m; 29 April-3 May 1957; fifth voyage. — 1 specimen. (L)

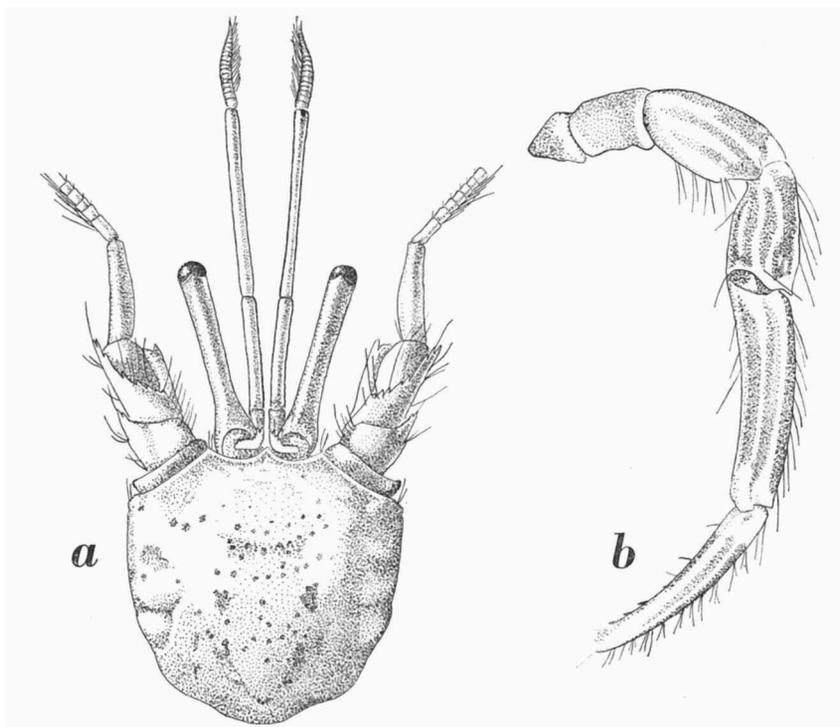


Fig. 28. *Clibanarius foresti* new species. a, anterior part of body in dorsal view; b, third pereiopod. Specimen from "Coquette" Sta. 166. a,  $\times 7$ ; b,  $\times 5$ . W. C. G. Gertenaar del.

About 15 miles N. of "Suriname Rivier" lightvessel; depth 18 m; 3 May 1957; fifth voyage. — 1 specimen. (L)

Near "Suriname Rivier" lightvessel; depth 7 m; 3 May 1957; fifth voyage. — 1 specimen. (L)

Station 1, off the mouth of the Suriname River,  $6^{\circ} 22' N$   $55^{\circ} 06' W$ ; bottom mud; depth 26 m; 11 May 1957. — 1 specimen. (W)

Station 2, off the mouth of the Suriname River,  $6^{\circ} 23' N$   $55^{\circ} 05.5' W$ ; bottom mud; depth 27 m; 11 May 1957. — 7 specimens (2 ovigerous). (W)

Station 15, N.E. of the mouth of the Suriname River,  $6^{\circ} 24.5' N$   $54^{\circ} 59.5' W$ ; bottom mud and shells; depth 29 m; 11 May 1957. — 1 specimen. (L)

Station 19, N.E. of the mouth of the Suriname River, 6° 27' N 54° 58' W; bottom shells; depth 31 m; 11 May 1957. — 1 specimen. (W)

Station 20, N.E. of the mouth of the Suriname River, 6° 28' N 54° 57.5' W; bottom shells; depth 31 m; 11 May 1957. — 5 specimens. (W)

Station 23, N.E. of the mouth of the Suriname River, 6° 24' N 54° 59.5' W; bottom shells; depth 27 m; 12 May 1957. — 1 specimen. (W)

Station 29, N.E. of the mouth of the Suriname River, 6° 49' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 1 specimen. (W)

Station 157, off the mouth of the Suriname River, 6° 22' N 55° 03.5' W; bottom mud; depth 24 m; 4 June 1957. — 1 specimen. (L)

Station 166, between the mouths of the Coppename and Suriname Rivers, 6° 18' N 55° 26' W; bottom mud and shells; depth 18 m; 6 June 1957. — 21 specimens (7 ovigerous). (W)

Station 178, N.E. of the mouth of the Coppename River, 6° 19' N 55° 50.5' W; bottom mud and shells; depth 27 m; 6 June 1957. — 1 specimen. (L)

Station 287, N.E. of the mouth of the Coppename River, 6° 52' N 55° 50' W; bottom mud, shells and coral; depth 48 m; 26 June 1957. — 1 specimen. (W)

Station 320, between the mouths of the Coppename and Suriname Rivers, 6° 47' N 55° 36' W; bottom shells, coral and sponges; depth 48 m; 20 July 1957. — 1 specimen. (W)

Description. The carapace length of the specimens varies between 2 and 12 mm; that of the ovigerous females between 4 and 8 mm.

The rostrum is very small and fails to reach the base of the ophthalmic scales. It is acute but not clearly set off from the front, the lateral margins merge insensibly into the anterior margin of the carapace. The lateral teeth of the front are also acutely pointed and are similar to the rostrum in shape and size. Between the rostrum and each lateral tooth the anterior margin of the carapace forms an evenly curved slightly concave line. Externally of the lateral teeth the margin of the carapace is directed obliquely posteriorly. The anterior margin of the carapace is somewhat elevated but behind it no distinct transverse groove is present as in *C. vittatus*. The region before the cervical groove is about as long as broad. A few hairs are visible in the anterior half of the carapace; most of these are situated laterally; far more hairs are visible behind the cervical groove.

The eyes are slender, but are definitely shorter than the anterior breadth of the carapace. They reach to or fail to reach to the end of the antennal peduncle, and fall far short of the middle of the last segment of the antennular peduncle. The ophthalmic scales are placed close together. They are triangular and end in one or two sharp teeth; in its distal half the outer margin bears one or two small denticles.

The antennulae are long, reaching with distinctly more than half the length of the ultimate segment of the peduncle beyond the eyes.

The scaphocerite reaches to the end of the penultimate segment of the antennal peduncle and bears about five well-developed teeth on its inner margin.

One or two strong spines are visible on the antennal peduncle near the external part of the base of the scaphocerite.

The chelipeds reach with about half or less than half the merus beyond the eyes. The chelae are practically equal, the left being slightly broader than the right. The outer surface of the palm bears a number of rather acute tubercles, some of which are horn-tipped. The four or five tubercles on the upper margin of the palm, and one near the articulation with the carpus are stronger and more sharply pointed than the rest. The inner surface of the palm bears blunt and flattened tubercles. The fingers have the tubercles as on the palm. Their cutting edges show two to four teeth, which are of equal size or show slight differences, the proximal then being larger than the distal. The tips of the fingers are pointed and show the usual dark coloured hoofs. The carpus bears a strong antero-dorsal spine, behind which there is a row of smaller less conspicuous teeth. The outer surface of the carpus bears several tubercles which in the upper part are more conspicuous than in the lower. The upper margin of the merus shows no spine. The outer surface is slightly granular, but bears a distinct tooth at the distal end of the lower margin; behind this tooth there is a groove, posteriorly of which a few minute spinules may be seen. The lower inner margin of the merus bears a row of small spinules or granules. The dactylus of the second legs is distinctly longer than the propodus; it ends in a black tip and bears a row of spines in the distal part of the ventral margin. The dorsal margin shows an indistinct longitudinal ridge. Many long tufts of hairs are present in the upper inner part of the dactylus; there is a longitudinal row of these tufts in the lower part of the inner surface, and four rows of very short tufts are visible on the outer surface, one of these on the lower margin. The propodus is curved and possesses an indistinct antero-ventral tooth; the arrangement of the tufts of hair is similar to that on the dactylus. The carpus bears a distinct acutely horn-tipped spine at the antero-dorsal point; behind this spine the dorsal margin sometimes shows some denticles. The outer anterior margin of the merus bears a strong spine below the articulation with the carpus. The right third leg strongly resembles the second, only the propodus is relatively slightly shorter. The left third leg has both the dactylus and the propodus with a distinct dorsal carina and a flattened outer surface. The propodus is distinctly shorter and higher than in the second leg and has the lower margin serrate. The merus also is somewhat shorter and higher than in the second leg.

Colour. In preserved specimens an orange-red mottling is visible in the anterior part of the carapace and on the antennal peduncles. The eyestalks present no colour at all or are of a pinkish colour which becomes somewhat more distinct near the base of the cornea. The outer surface of the palm of the

chelipeds is orange-red, the tubercles are white; the outer surface is of a darker red, the inner surface being paler. The tips of the fingers and the base of the dactylus are white, the hoofs are almost black. The carpus and merus are mottled with orange-red. A conspicuous purple spot is present in the distal part of the inner surface of the merus. The dactylus and propodus of the walking legs have a dark dorsal line of red. The outer surface of both segments shows two broad longitudinal red streaks, while also on the inner surface of the dactylus two broad red streaks are visible. The lower margin of the dactylus also shows a red band. These red streaks do not attain the very base of the dactylus, and also end at a short distance before the dark tip; hereby the impression is obtained that the dactylus is provided with a white basal and distal ring. In the white basal region a small oblique red spot is visible. The inner surface of the propodus shows four longitudinal red streaks, which sometimes are more or less distinctly fused. The propodus shows a distal, but no basal white band; in this distal band the upper outer and the one but upper inner red band are continued as a narrow line. The carpus has the dorsal line white, while four rather broad red bands extend over the full length of the outer surface. Also the inner surface shows some red bands, which often are not distinctly separated the one from the other. The upper half of the outer surface of the merus is red with a few white spots, the lower half shows two longitudinal red bands. The third legs have a colour pattern which is very similar to that of the second.

The specimens inhabited the shells of the following Gastropod molluscs: *Natica canrena* (L.) (3 specimens), *Bursa spadicea* (Montf.) (11 specimens), *Murex* (*Murex*) spec. (2 specimens), *Thais* (*Stramonita*) *haemastoma floridana* (Conrad) (2 specimens), *Nassarius* spec. (1 specimen), *Marginella* spec. (3 specimens).

Remarks. The present new species is most closely related to *Clibanarius vittatus* (Bosc) and *C. sclopetarius* (Herbst), resembling these species in having the dactyli of the walking legs longer than the propodus and in the striped colour pattern of the legs. From both these species *C. foresti* may be at once distinguished by the short rostrum and by the very long antennulae. Furthermore the shape and coloration of the legs is different. Also *C. foresti* is a distinctly smaller species than either *C. vittatus* or *C. sclopetarius*.

Type. Holotype is the specimen from N.N.W. of the mouth of the Marowijne River at about 20 miles offshore (second voyage of the "Coquette"). It is inserted in the collection of the Rijksmuseum van Natuurlijk Historie under the registered number Crustacea D. 12588. The other specimens are paratypes.

The species is named for M. Jacques Forest, Muséum National d'Histoire Naturelle, Paris, who at present is the foremost authority on the Paguridae.

**Petrochirus diogenes** (Linnaeus, 1758)

## Coquette Investigations

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 1 female. (W)

Stations 267 and 273, between the mouths of the Coppename and Suriname Rivers, 6° 42'—6° 41' N 55° 43'—55° 45' W and 6° 41'—6° 40.5' N 55° 41'—55° 25' W; bottom mud and shells; depth 44 m; 20 and 21 June 1957. — 1 male. (W)

Station 331, between the mouths of the Coppename and Suriname Rivers, 6° 51' N 55° 25' W; bottom mud and shells; depth 53 m; 20 July 1957. — 1 male. (L)

Description. Benedict, 1901, p. 140; Schmitt, 1935, p. 206, fig. 66 (both under the name *Petrochirus bahamensis* (Herbst)).

Remarks. The specimens are well developed; their carapace length lies between 32 and 60 mm.

The species is best known as *Petrochirus granulatus* (Olivier, 1811) or as *P. bahamensis* (Herbst, 1791). The correct name, however, proves to be *Petrochirus diogenes* (Linnaeus, 1758). Linnaeus (1758, p. 631) described his *Cancer Diogenes* as follows:

“C. [ancer] macrourus parasiticus, chelis muricatis: dextra majore.

*Brown. jam.* 424. *Astacus maximus*, cauda subnuda molli, chelis subverrucosis tuberculatis: dextra majore.

*Rumph. mus. t.* 5. *f.* K. L.

*Catesb. car.* 2 t. 34.

*Habitat in Oceano Asiatico, Americano, intra testas varias Concharum.*”

Rumphius's animal represents an Indo-West Pacific species of *Coenobita*. As the figures printed in Rumphius's work all are the mirror images of the original drawings, the *Coenobita* is shown with the right chela larger than the left. Catesby's (1754, p. 34, pl. 34) description and figure make it beyond any doubt that his *Cancellus maximus Bahamensis* is identical with the present *Petrochirus* species. Browne's (1756, p. 424) latin description which is quoted in its entirety by Linnaeus is rather short, but also indicates the present species, which is furthermore confirmed by Browne's reference to Catesby's plate 34 and by his statement that “This shell-fish grows to be one of the largest of the tribe in America”. *Cancer Diogenes* L., 1758, thus is a composite species, being based on the E. American *Petrochirus* species and on one of the Indo-West Pacific species of *Coenobita*. In order to definitely settle the identity of this composite species I now select as its lectotype the specimen figured by Catesby (1754) on pl. 34 of the second volume of his Natural History of Carolina.

Herbst's (1791, vol. 2, p. 30) *Cancer Bahamensis* is based exclusively on the description and figure of Catesby's *Cancellus maximus Bahamensis*; thus

*Cancer Diogenes* L. and *Cancer Bahamensis* Herbst have the same specimen as type specimen and therefore are objective synonyms of each other.

The specific name *diogenes* L. has not been in use for the last 40 years and its reintroduction for the American *Petrochirus* species will not produce any confusion. Also the disappearance of the specific name *bahamensis* will not cause any difficulties, first because the species in question was not very often referred to in the literature, and second while the use of that specific name is not of very long standing, in the previous century the species being generally indicated as *Petrochirus granulatus* (Olivier). There is no good reason therefore not to strictly follow the Rules here.

The specific name *diogenes* formerly has often erroneously been given to the species *Coenobita clypeatus* (Herbst, 1798). This incorrect identification of *Cancer diogenes* L. is caused by that Linnaeus (1767, p. 1049) in the 12th edition of his *Systema Naturae* changed his views as to the status of the various species of hermit crabs and attached the name *diogenes* to a species which he described as follows:

"C.[ancer]macrourus parasiticus, chelis laevibus pubescentibus: sinistra majore.

*Gron. zooph.* 983.

*Rumph. mus.* t. 5. f. K.L.

*Catesb. car.* 2. t. 33. f. 1, 2.

*Kaempf. jap.* t. 13. f. 7.

*Habitat in Oceano Asiatico, Americano, intra testas varias Cochlearum*".

Most of the references now given by Linnaeus deal with species of the genus *Coenobita*. So Catesby's (1754) pl. 33 figs. 1, 2, clearly show *Coenobita clypeatus* (Herbst). Rathbun (1919, p. 329) was the first to point to the fact that the name *diogenes* cannot be used for the east American *Coenobita* and she adopted the correct name *C. clypeatus* for that species, being followed in this by practically all subsequent authors. Though Rathbun rejected the specific name *diogenes* for *Coenobita clypeatus*, she did not use this name for the E. American *Petrochirus* though she stated that "the remainder of Linnaeus's description is not inapplicable" to that species.

Type locality. "*In Oceano Asiatico, Americano*" (Linnaeus, 1758, p. 631). By the present lectotype selection the type locality is now restricted to "near the shores of the *Bahama Islands*" (Catesby, 1754, vol. 2, p. 34).

Distribution. East coast of America from North Carolina (U.S.A.) to Brazil and the West Indies. The species is now reported for the first time from Suriname.

**Dardanus venosus** (H. Milne Edwards, 1848)

## Coquette Investigations

20 miles N.N.W. of the mouth of the Coppename River; depth 31 m; 1-5 April 1957; first voyage. — 1 female. (L)

N.N.W. of the mouth of the Marowijne River; 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 male, 1 ovigerous female. (L)

20 miles N. of the Suriname coast between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 2 males, 2 juveniles. (L)

20 miles N. of the mouth of the Marowijne River; depth 27 m; 23-27 April 1957; fourth voyage. — 1 female. (L)

N.N.W. of the mouth of the Marowijne River, about 30 miles offshore; depth 37 m; 29 April-3 May 1957; fifth voyage. — 1 male. (L)

20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; sixth voyage. — 1 female. (L)

Station 1, off the mouth of the Suriname River, 6° 22' N 55° 06' W; bottom mud; depth 26 m; 11 May 1957. — 1 male. (W)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 1 male. (W)

Station 3, off the mouth of the Suriname River, 6° 24' N 55° 05' W; bottom shells; depth 27 m; 11 May 1957. — 1 juvenile. (W)

Station 11, off the mouth of the Suriname River, 6° 24' N 55° 01' W; bottom mud; depth 27 m; 11 May 1957. — fragments. (L)

Station 23, N.E. of the mouth of the Suriname River, 6° 24' N 54° 59.5' W; bottom shells; depth 27 m; 12 May 1957. — 1 female. (W)

Station 26, N.E. of the mouth of the Suriname River, 6° 40' N 54° 58' W; bottom shells; depth 37 m; 12 May 1957. — 1 juvenile. (W)

Station 28, N.E. of the mouth of the Suriname River, 6° 48' N 54° 54' W; bottom shells; depth 46 m; 12 May 1957. — 1 juvenile. (W)

Station 29, N.E. of the mouth of the Suriname River, 6° 49' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 1 male, 1 female. (W)

Station 32, N.E. of the mouth of the Suriname River, 6° 51' N 54° 53.5' W; bottom mud and shells; depth 51 m; 12 May 1957. — 2 males. (W)

Station 36, N.E. of the mouth of the Suriname River, 6° 55' N 54° 54' W; bottom mud; depth 55 m; 12 May 1957. — 1 ovigerous female. (W)

Station 159, off the mouth of the Suriname River, 6° 22' N 55° 02.5' W; bottom mud; depth 26 m; 4 June 1957. — 1 juvenile. (W)

Station 287, N.E. of the mouth of the Coppename River, 6° 52' N 55° 50' W; bottom mud, shells and coral; depth 48 m; 26 June 1957. — 2 juveniles. (W)

Station 290, N.E. of the mouth of the Coppename River, 6° 53' N 55° 55' W; bottom mud, shells and coral; depth 49 m; 27 June 1957. — 1 female. (L)

Station 306, N.W. of the mouth of the Coppename River, 6° 54' N 56° 14' W; bottom shells and coral; depth 49 m; 7 July 1957. — 1 ovigerous female. (W)

Station 318, between the mouths of the Coppename and Suriname Rivers, 6° 42' N 55° 38' W; bottom mud and fine shells; depth 44 m; 20 July 1957. — 1 ovigerous female. (W)

Description. Benedict, 1901, p. 141 (as *Pagurias insignis*); Schmitt, 1935, p. 201, fig. 62.

Remarks. The species is represented by specimens which have cl. ranging between 4 and 25 mm; the ovigerous females have cl. between 10 and 15 mm.

The specimens inhabited the shells of the following gastropod molluscs: *Natica canrena* (L.) (1 specimen), *Bursa spadicea* (Montf.) (1 specimen), *Tonna galea* (L.) (2 specimens), *Murex (Chicoreus) brevifrons* Lam. (1 specimen), *Turbinella laevigata* Anton (1 specimen). The shell of the specimen from Station 2 (*Polinices* spec.) carried a sea-anemone of the species *Calliactis tricolor* (Lesueur, 1817), which was identified by Dr. Charles E. Cutress, U.S. National Museum, Washington, D.C. The shell of the specimen from Station 318 was overgrown by a sponge to such an extent that the shell was not at all visible; the diameter of the sponge was about 60 × 80 mm.

Type locality. Guadeloupe.

Distribution. East American waters from Bermuda and Florida to Brazil and the West Indies. The species has not been reported before from Suriname.

### ***Pylopagurus spinulosus*** new species (textfigs. 29, 30)

#### Coquette Investigations

20 miles N. of the Suriname coast between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 ovigerous female. (L)

Description. In many respects the present species resembles *P. ungulatus* (Studer) as described by A. Milne Edwards & Bouvier (1893, p. 80, pl. 6 figs. 15-18). The carapace length of the present specimen is 6 mm. The rostrum ends in a triangular point the tip of which is rounded. The anterolateral angles of the carapace are rounded. The ophthalmic plates are like those described for *P. ungulatus*: broad at the base and ending in a narrower lanceolate tip below which there is a distinct spine. The eyes are slightly broader than figured by the French authors; they are overreached by the scaphocerite. The cornea is distinctly broader than the stalk and is somewhat flattened anteriorly. The last segment of the antennular peduncle is almost twice as long as the penultimate. The antenna does not seem to differ from that of *P. ungulatus*.

In the right cheliped the merus and carpus are remarkable by that the lower margin of each shows a large protuberance, which in the merus is conical, in the carpus more obtuse. Especially on the anterior margin of the outer surface these protuberances show a fine granulation. The lower end of the anterior margin of the outer surface of the merus bears two small teeth. The upper surface of the carpus, like in *P. ungulatus*, bears numerous sharp spinules, being bordered on the inner side by a row of much larger spinules. The outer row of spinules, however, is not very distinct. Both the outer and the inner surface of the carpus show an oblique carina which extends from

the antero-dorsal angle obliquely posteriorly and ventrally. The outer surface of the chela is ovate with a raised rim. With this chela the animal, which lived in a tube formed by Bryozoans, could perfectly shut off the opening of the tube. The rim of the chela consists of irregularly alternating large and small spines. The outer surface of the chela itself is covered with spinules of vary-

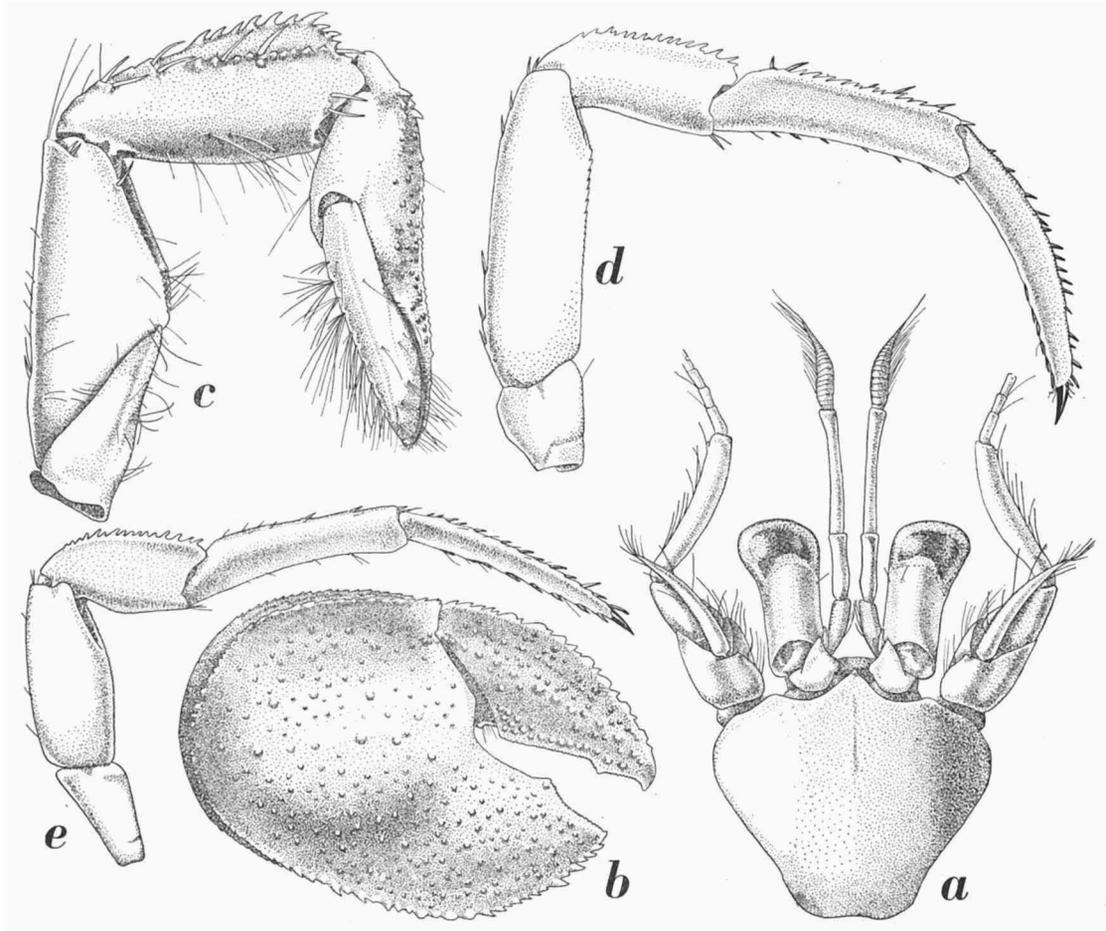


Fig. 29. *Pylopagurus spinulosus* new species, holotype. a, anterior part of body in dorsal view; b, large chela; c, smaller cheliped; d, second pereopod; e, third pereopod. a, b,  $\times 10$ ; c,  $\times 15$ ; d,  $\times 12$ ; e,  $\times 7.5$ . W. C. G. Gertenaar del.

ing size: some of these are somewhat constricted near the base, but none is actually mushroom-shaped as described by A. Milne Edwards & Bouvier for *P. unguatus*. The largest spinules of the outer surface are arranged in two parallel oblique rows. The median part of this surface is slightly elevated.

The dactylus is narrower than the fixed finger. The cutting edge of each finger bears a single small tooth; the tooth of the dactylus is placed before that of the fixed finger. The inner surface of the palm is granular and shows two sharp carinae which begin at the articulations with the carpus and are directed obliquely distally and medially. When the chela is flexed inward (as it is when used for closing the tube in which the animal lives), these two carinae fit tightly to the carinae on the inner and outer surface of the carpus. The left chela is very small. The fingers are distinctly longer than the palm and

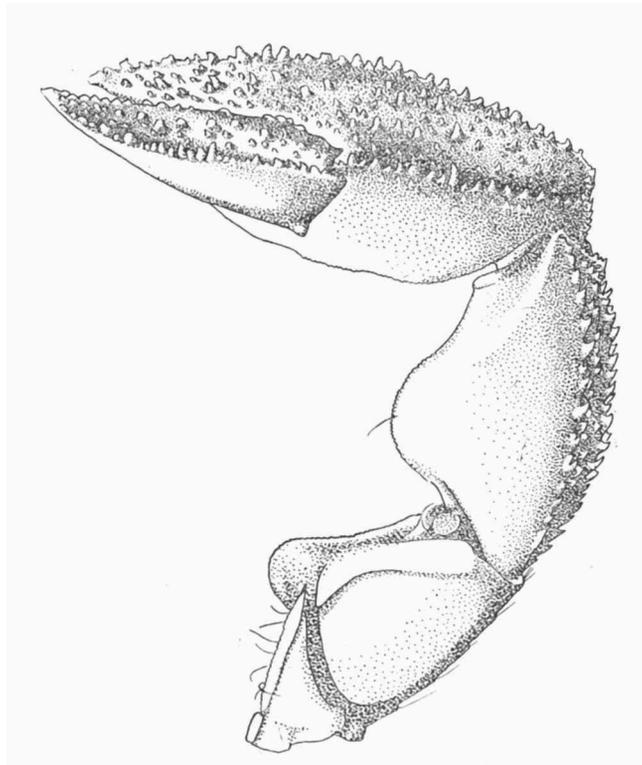


Fig. 30. *Pylopagurus spinulosus* new species, holotype. Larger cheliped.  $\times 12$ .  
W. C. G. Gertenaar del.

close over their entire length. The cutting edges are provided with a row of closely placed, comb-like arranged horny spinules. Minute, often blunt spinules are placed on the other surface of the chela, those in the lower basal part being largest. A distinct carina extends over the lower margin of the chela; a similar carina is found on the upper margin of the dactylus. The inner surface of the chela bears many tufts of hair, which are especially dis-

tinct near the upper margin of the dactylus. The carpus has a strong antero-dorsal spine, behind which there is a long row of somewhat smaller spines. On the anterior margin, to the interior of the antero-dorsal spine, three smaller spines are visible, while on the inner surface, somewhat below the dorsal row of spines, there is a parallel row of spinules. The merus has two spines on the outer antero-ventral angle. In the walking legs the propodi are slightly shorter than the dactyli. The latter have both the upper and the lower margin provided with movable spinules. Spine-like hairs are present in the upper part of the propodus, carpus and merus. In the second pereopods the upper margin of the carpus and the propodus are finely and closely serrate, in the third leg this serration is visible in the carpus only. The lower margin of the merus is sometimes finely serrate.

Colour. Only very faint traces of the original coloration are visible as scattered reddish dots on the larger cheliped.

Remarks. The species is most closely related to *Pylopagurus unguulatus* (Studer), which originally was described from off the Cape of Good Hope and was later reported by A. Milne Edwards & Bouvier (1893) from Yucatan Bank. The differences from this species have already been mentioned in the description.

The holotype is placed in the collection of the Leiden Museum under Reg. No. Crustacea D 11981.

***Pylopagurus operculatus*** (Stimpson, 1859) (textfig. 31)

Coquette Investigations

Station 30, N.E. of the mouth of the Suriname River, 6° 49.5' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 1 male. (L)

Station 290, off the mouth of the Coppename River, 6° 53' N 55° 55' W; bottom mud, shells and coral; depth 49 m; 27 June 1957. — 1 female. (L)

Description. The anterior shield of the carapace is about as long as broad; it bears a few scattered hairs. The rostrum is visible only as a broad convexity of the anterior margin of the carapace; it almost fails to reach the base of the ophthalmic scales. The lateral teeth are angular, each bears a small outwards directed sharp tip.

The eyestalks are distinctly shorter than the anterior breadth of the carapace. The cornea is much broader than the end of the stalk and is rounded; dorsally its basal margin shows a more or less distinct emargation. The ophthalmic scales are separated by a short distance; they are broad at the base and taper regularly towards the sharp top, being longer than broad; they distinctly overreach the base of the eyes. The upper surface of the distal part of the scales is concave.

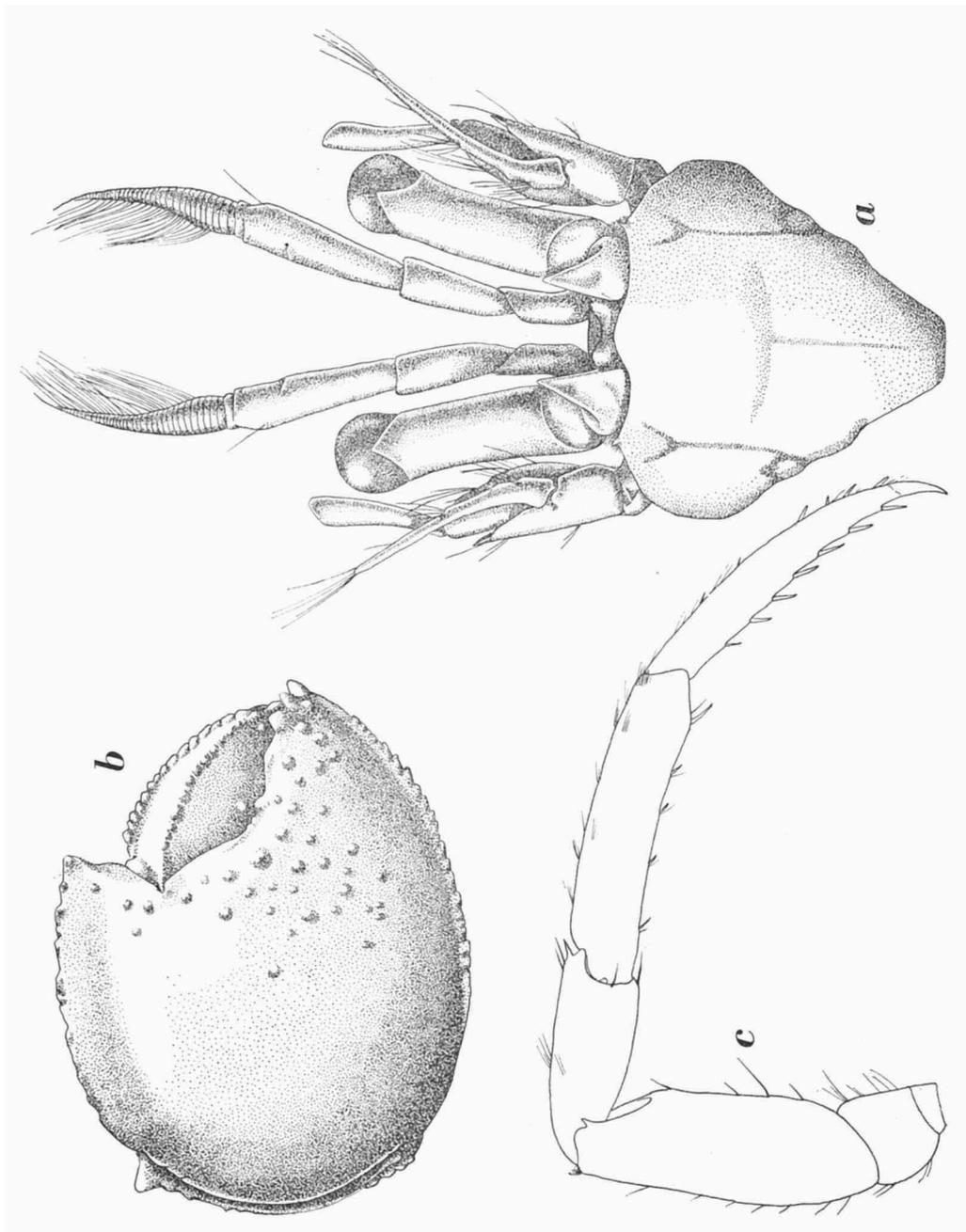


Fig. 31. *Pylodagurus operculatus* (Stimpson). a, anterior part of body in dorsal view; b, large chela; c, second pereopod. Specimen from "Coquette" Sta. 30. a, X 12; b, c, X 9. a, b, W. C. G. Gertenaar del.

The antennular peduncle in the male reaches beyond the eyes with half the last segment, in the female the peduncle surpasses the eye with the entire last segment. The antennal peduncle attains the end of the cornea or reaches slightly beyond it. The scaphocerite overreaches the middle of the last segment of the antennal peduncle; it is curved outwards and bears some stiff hairs but no spines. The second segment of the peduncle bears a small antero-internal spine on the upper surface near the base of the scaphocerite, and a strong, pointed antero-external process.

The right cheliped is far stronger than the left. Hardly any hair is visible on it. The palm has both upper and lower margin sharply carinate and more or less distinctly serrate. The outer surface is smooth but for a number of rounded tubercles. In the male these tubercles are very small, except in the upper half of the fixed finger and the adjoining part of the palm, where they are conspicuously larger; in the female the palm shows granules on the fixed finger and the distal part of the palm, the rest of the surface being smooth. The cutting edge of the fixed finger in the male bears about six large teeth, which are extremely inconspicuous in the female. The dactylus of my specimens has the upper margin carinate and serrate; it lies distinctly below the upper margin of the palm so that the two do not form a continuous line as shown in Stimpson's (1858) figure. A longitudinal serrate carina extends over the entire length of the middle of the outer surface of the dactylus. The inner surface of the chela is slightly convex and shows some small flattened tubercles. The outer surface of the carpus bears a few small inconspicuous tubercles and a few small and blunt spines. On the lower margin an indistinctly serrated carina is present while the upper margin is provided with two antero-dorsal spines, behind the outer of which there is a row of about four strong and pointed spines between which some smaller blunt ones are placed. The inner surface of the carpus bears in its upper part some tubercles, while furthermore two carinae are present. These carinae start at the antero-dorsal and antero-ventral angles of the carpus, then run close along the inner anterior margin, to curve backwards near the middle of the inner surface. When the chela is flexed inwards, it rests against these carinae, just like in the other species of *Pylopagurus*. The merus is smooth and shining; in the male it bears two strong antero-ventral spines, in the female only one such spine is visible. The lower margins of the merus are indistinctly serrate, the outer bears a well-developed anterior spine. The left cheliped is short and slender. The chela is about twice as long as broad and bears no spines at all. The fingers are longer than the palm; the cutting edges close over practically their entire length and are provided with many closely placed, comb-like arranged horny denticles, exactly like in *P. spinulosus*. The carpus bears two antero-

dorsal spines, behind each of which there is a longitudinal row of spines. The outer surface bears a strong antero-ventral spine. The lower margins of the merus are indistinctly serrate; the outer bears a strong anterior spine.

The second legs have the dactylus slightly longer than the propodus. The tip of the dactylus is of a horny colour, while about 7 movable spines of the same colour are implanted on the lower margin. The ventral margin of the propodus also possesses some, but much smaller spines, only the antero-ventral being as large as the spines of the dactylus. The carpus bears a distinct antero-dorsal spine. The merus shows an antero-ventral spine on the outer surface. The third leg is very similar to the second, but no spine is present here on the merus.

A pair of pleopods is present on the first abdominal segment of the female, just like in the previous species. These pleopods are absent in the male.

Colour. In the female the colour pattern is still partly visible: The carapace bears two orange-red spots near the anterior margin behind the bases of the eyes, and a lighter spot near the antero-lateral margin. The ophthalmic scales and the peduncles of the eyes are pale orange-red, the peduncles becoming paler distally. The basal two segments of the antennular peduncle are pale orange, in its basal part the ultimate joint shows a violet band. The base of the antennal peduncles is again of an orange colour. The merus and carpus of the large chela are orange with small white spots. The palm is of a much paler colour; the upper part is whitish but for a small orange spot on the upper margin; the lower margin of the palm bears several small orange spots. The fingers are white. The smaller cheliped has a pale orange-red band over the palm, one over the middle of the carpus, and one over the middle of the merus. In the walking legs the dactylus shows two orange-red bands, one in the distal and one in the proximal part; the propodus, carpus, and merus are provided with a single band each. In the propodus this band lies slightly distally of the middle, while in the two other segments it is situated in the basal part.

The specimen from Sta. 30 inhabited the shell of a species of *Fusinus*.

Remarks. The specimens differ from Stimpson's original description of *Pagurus operculatus* by the slightly different outline of the chela, and by having the dactyli of the walking legs longer than the propodi. Because of these differences and because of the fact that Stimpson's description is very short, I am not quite certain that the above specimens are correctly assigned to Stimpson's species. The shape of the chela and the presence of the first pleopods in the female show that the species belongs to the genus *Pylopagurus*.

Type locality. Tortugas, Florida, U.S.A.

Distribution. The original record is the only one known to me.

## Section Galatheidea

## Family Porcellanidae

**Minyocerus angustus** (Dana, 1852)

## Coquette Investigations

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 1 specimen. (L)

Station 260, between the mouths of the Coppename and Suriname Rivers, 6° 40'—6° 41.5' N 55° 26'—55° 41' W; bottom mud, shells and coral; depth 42 m; 20 June 1957. — 1 specimen. (W)

Description. Dana, 1852, p. 423; 1855, pl. 26 fig. 12.

Remarks. The specimen from Station 260 (cl. 3 mm) lacks all its legs; the other (cl. 5 mm) has the left frontal tooth of the carapace extremely short, this tooth has evidently broken off, and is now in the process of regeneration.

Dana's description and figures fit well for the material at hand. The larger specimen, however, differs from the figure in having the fingers of the cheliped less than  $\frac{2}{3}$  of the length of the palm; as this character is not discussed in Dana's text, his figure may be erroneous. In Müller's (1863, pl. 1 fig. 1) figure of the species the fingers appear even shorter than they are in my specimen; in this figure the spines on the merus and carpus, which are correctly figured by Dana, have been entirely omitted.

In my larger specimen the chelipeds are similar in shape, but the left is more heavy than the right.

Type locality. Rio de Janeiro, Brazil.

Distribution. Panama?, Venezuela, Brazil (S. to Desterro). Commensally living on sea stars. The species is now reported for the first time from Suriname.

**Porcellana sayana** (Leach, 1820)

## Coquette Investigations

20 miles N.N.W. of the mouth of the Coppename River; depth 31 m; 1-5 April 1957; first voyage. — 4 specimens (2 ovigerous). (L)

20 miles N. of the coast between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 specimen. (L)

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 27 m; 29 April-3 May 1957; fifth voyage. — 2 specimens. (L)

20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; 6th voyage. — 2 specimens. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 1 specimen. (L)

Station 331, between the mouths of the Coppename and Suriname Rivers, 6° 51' N 55° 25' W; bottom mud and shells; depth 53 m; 20 July 1957. — 2 specimens. (W)

Description. Benedict, 1901, p. 137, pl. 3 fig. 10.

Remarks. The specimens have cl. ranging between 4 and 7 mm, in the

ovigerous females it is 6 and 7 mm. In some of the specimens traces of the original colour pattern are still visible, closely agreeing with the description given by Benedict (1901).

Type locality. "Habite les côtes de la Géorgie et de la Florida dans l'Amérique" (Leach, 1820, p. 55).

Distribution. Atlantic coast of America from North Carolina (U.S.A.) to Mexico, Panama, and Venezuela; the Bahama Islands and the Antilles from Cuba to Barbados. The species is now reported for the first time from Suriname.

***Petrolisthes galathinus*** (Bosc, 1801-1802)

Coquette Investigations

Station 86, N. of Isle de Salut, French Guiana, 5° 49.5' N 53° 09' W; bottom rocky with mud, coral and shells; depth 27 m; 22 May 1957. — 2 specimens (1 ovigerous). (L)

Description. Benedict, 1901, p. 133 (as *P. sexspinosus*); see also Haig, 1956, p. 22.

Remarks. The specimens are remarkably large, the ovigerous female has cl. 14 mm, while in the other specimen it is 15 mm. Neither specimen shows spines on the dactylus of the chelipeds. The carapace has many transverse and some oblique purple streaks; no longitudinal colour lines are visible.

Type locality. Unknown.

Distribution. North Carolina (U.S.A.) to Brazil and the West Indies. The species is now reported for the first time from French Guiana.

Suborder Brachyura

Section Dromiacea

Family Dromiidae

***Dromidia antillensis*** Stimpson, 1859

Coquette Investigations

Between the mouths of the Nickerie and Coppename Rivers, 20 miles offshore; depth 27 m; 15-20 April 1957; third voyage. — 1 female. (L)

Station 29, N.E. of the mouth of the Suriname River, 6° 49' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 1 female. (W)

Description. Rathbun, 1937, p. 33, textfig. 12, pl. 7 figs. 1-3.

Remarks. The first mentioned specimen has cl. 19 mm, the other 14 mm. Both carried a compound ascidian; in the smaller specimen the ascidian covered the carapace completely, in the larger it showed a large hole in the middle which exposed the central part of the carapace.

Type localities. Key Biscayne and Tortugas (Florida, U.S.A.), and St. Thomas.

Distribution. Bermuda and North Carolina (U.S.A.) to Brazil and the West Indies. Until now the species was not known from Suriname.

**Hypoconcha arcuata** Stimpson, 1859

## Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 female. (L)

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 27 m; 29 April-3 May 1957; fifth voyage. — 1 female. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 1 male. (L)

Description. Rathbun, 1937, p. 47, pl. 11.

Remarks. The female specimens have cl. 13 and 9 mm, the male 8 mm.

Type locality. "Sandy shores of South Carolina", U.S.A., and St. Thomas, West Indies.

Distribution. North Carolina (U.S.A.) to Brazil and the West Indies. The species is now reported for the first time from Suriname.

## Section Oxystomata

## Family Calappidae

**Calappa nitida** Holthuis, 1958 (textfigs. 32-35)

*Calappa nitida* Holthuis, 1958, p. 172, figs. 46-50.

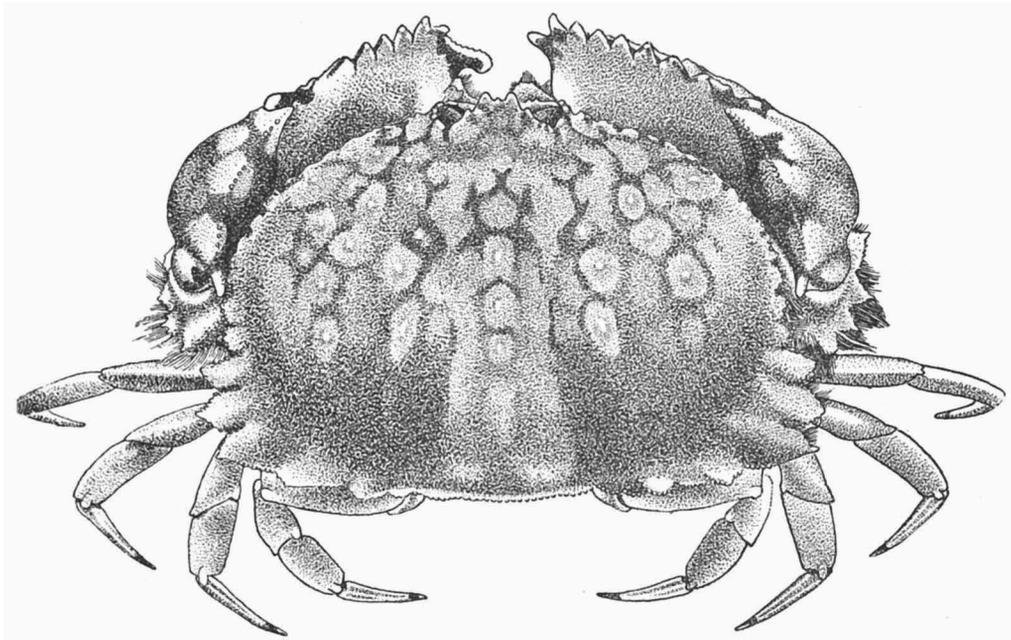


Fig. 32. *Calappa nitida* Holthuis. Male paratype from N.N.W. of the mouth of the Marowijne River. Natural size. After Holthuis, 1958.

## Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 male, 1 female, 2 juveniles. (L)

Between the mouths of the Nickerie and Coppename Rivers, 20 miles offshore; depth 27 m; 15-20 April 1957; third voyage. — 2 males, 1 female, 1 juvenile. (L)

20 miles N. of the mouth of the Marowijne River; depth 27 m; 23-27 April 1957; fourth voyage. — 2 males, 3 females. (L)

N.N.W. of the mouth of the Marowijne River, about 30 miles offshore; depth 0 to 37 m; 29 April-3 May 1957; fifth voyage. — 15 males, 7 females (2 ovigerous). (L)

About 20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; sixth voyage. — 1 male, 1 juvenile. (L)

Station 1, off the mouth of the Suriname River, 6° 22' N 55° 06' W; bottom mud; depth 26 m; 11 May 1957. — 1 male. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud;

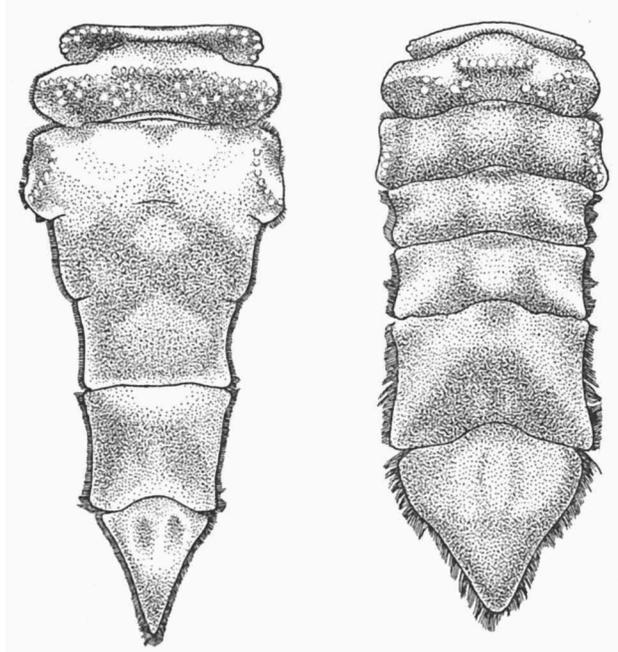


Fig. 33. *Calappa nitida* Holthuis. a (left figure), abdomen of male; b (right figure), abdomen of female. a, specimen from N.N.W. of mouth of Marowijne River; b, specimen from "Coquette" Sta. 11. a, b,  $\times 2$ . After Holthuis, 1958.

depth 27 m; 11 May 1957. — 3 females (1 ovigerous), 2 juveniles. (L + W)

Station 3, off the mouth of the Suriname River, 6° 24' N 55° 05' W; bottom shells; depth 27 m; 11 May 1957. — 1 juvenile. (L)

Station 11, off the mouth of the Suriname River, 6° 24' N 55° 01' W; bottom mud; depth 27 m; 11 May 1957. — 2 females (1 ovigerous). (L)

Station 26, N.E. of the mouth of the Suriname River, 6° 40' N 54° 58' W; bottom shells; depth 37 m; 12 May 1957. — 2 juveniles. (W)

Station 30, N.E. of the mouth of the Suriname River,  $6^{\circ} 49.5' N$   $54^{\circ} 54' W$ ; bottom hard mud and shells; depth 48 m; 12 May 1957. — 1 female. (W)

Station 31, N.E. of the mouth of the Suriname River,  $6^{\circ} 50' N$   $54^{\circ} 53.5' W$ ; bottom hard mud and shells; depth 49 m; 12 May 1957. — 1 female. (W)

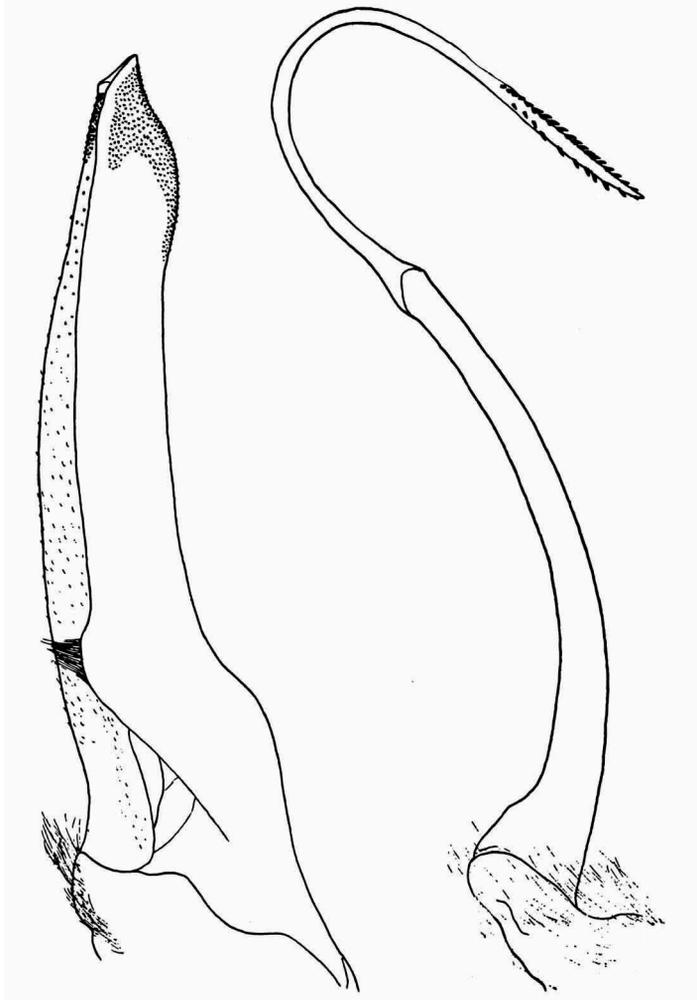


Fig. 34. *Calappa nitida* Holthuis. First male pleopod. Specimen from N.N.W. of mouth of Marowijne River.  $\times 7$ . After Holthuis, 1958.

Fig. 35. *Calappa nitida* Holthuis. Second male pleopod. Specimen from N.N.W. of mouth of Marowijne River.  $\times 7$ . After Holthuis, 1958.

Station 33, N.E. of the mouth of the Suriname River,  $6^{\circ} 52' N$   $54^{\circ} 53' W$ ; bottom mud and shells; depth 51 m; 12 May 1957. — 1 ovigerous female. (W)

Station 36, N.E. of the mouth of the Suriname River,  $6^{\circ} 55' N$   $54^{\circ} 54' W$ ; bottom mud; depth 55 m; 12 May 1957. — 1 male. (W)

Station 213, between the mouths of the Suriname and Marowijne Rivers, 6° 46' N 54° 29.5' W; bottom mud; depth 44 m; 14 June 1957. — 1 female. (W)

Station 214, between the mouths of the Suriname and Marowijne Rivers, 6° 47' N 54° 29' W; bottom mud and fine shells; depth 44 m; 14 June 1957. — 1 male. (W)

Station 235, between the mouths of the Suriname and Marowijne Rivers, 6° 23.5' N 54° 29.5' W; bottom mud; depth 29 m; 15 June 1957. — 1 female. (W)

Station 260, between the mouths of the Coppename and Suriname Rivers, 6° 40'—6° 41.5' N 55° 26'—55° 41' W; bottom mud, shells and coral; depth 42 m; 20 June 1957. — 1 male, 2 females. (W)

Station 290, off the mouth of the Coppename River, 6° 53' N 55° 55' W; bottom mud, shells and coral; depth 49 m; 27 June 1957. — 1 juvenile. (L)

Description. Holthuis, 1958, p. 172, figs. 46-50.

Remarks. The original description of this species is based on the above specimens of the Leiden Museum, the material of the Washington Museum was received too late to have it reported upon in my 1958 paper.

Neumann (1878, p. 28) reported "*C. [alappa] marmorata* Fabr." from "Surinam" and gave as a synonym *Cancer flammeus* Herbst. Without examination of Neumann's material it is impossible to know its identity. As has been pointed out on a previous page (p. 14) it is probable that all of Neumann's so-called Suriname material actually originated from the Antilles.

In the collection of the Hamburg Museum is preserved a male specimen of *Calappa ocellata* Holthuis, which is labelled "Surinam", but which, as Dr. A. Panning kindly pointed out to me, might in reality have been collected at Barbados. For this reason the species is omitted here. This seems the more justified as *Calappa ocellata* is a species which seems to prefer a habitat of coral sand and therefore is not likely to occur on the muddy Suriname coast.

Type locality. N.N.W. of the mouth of the Marowijne River, Suriname about 30 miles offshore, depth 0 to 37 m.

Distribution. Until now the species is known only from off the coast of Suriname, where it proves to be far from rare.

### ***Calappa sulcata* Rathbun, 1898**

*Calappa sulcata* Holthuis, 1958, p. 179, figs. 51-54.

#### Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 male, 1 female, 3 juveniles. (L)

20 miles off the coast between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 juvenile. (L)

20 miles N. of the mouth of the Marowijne River; depth about 27 m; 23-27 April 1957; fourth voyage. — 1 male, 10 juveniles. (L)

N.N.W. of the mouth of the Marowijne River, about 30 miles offshore; depth 0-37 m; 29 April-3 May 1957; fifth voyage. — 3 males, 4 females. (L)

15 miles N. of the lightvessel "Suriname Rivier"; depth 18 m; 3 May 1957; fifth voyage. — 1 juvenile. (L)

20 miles N. of the mouth of the Suriname River; depth 0 to 9 m; 6-9 May 1957; sixth voyage. — 3 juveniles. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 3 juveniles. (W)

Station 36, N.E. of the mouth of the Suriname River, 6° 55' N 54° 54' W; bottom mud; depth 55 m; 12 May 1957. — 3 juveniles. (W)

Station 188, N.E. of the mouth of the Suriname River, 6° 24' N 54° 55' W; bottom mud; depth 27 m; 10 June 1957. — 1 female, 2 juveniles. (W)

Station 209, between the mouths of the Suriname and Marowijne Rivers, 6° 41' N 54° 33' W; bottom mud and shells; depth 40 m; 14 June 1957. — 1 male. (W)

Station 213, between the mouths of the Suriname and Marowijne Rivers, 6° 46' N 54° 29.5' W; bottom mud; depth 44 m; 14 June 1957. — 2 males. (W)

Station 214, between the mouths of the Suriname and Marowijne Rivers, 6° 47' N 54° 29' W; bottom mud and fine shells; depth 44 m; 14 June 1957. — 1 male, 1 female. (W)

Station 216, N.W. of the mouth of the Marowijne River, 6° 41.5' N 54° 16' W; bottom mud; depth 44 m; 14 June 1957. — 1 male. (W)

Station 217, N.W. of the mouth of the Marowijne River, 6° 41.5' N 54° 14.5' W; bottom mud; depth 44 m; 14 June 1957. — 1 male, 1 female. (W)

Station 218-219, N.W. of the mouth of the Marowijne River, 6° 42' N 54° 13.5'—54° 12.5' W; bottom mud; depth 44 m; 14 June 1957. — 2 males, 1 female. (W)

Suriname. — 3 females. (W)

Description. Rathbun, 1937, pp. 205 (as *C. springeri* Rathbun), 211, pl. 60 fig. 2 (as *C. springeri*), pl. 64 figs. 7, 8, pl. 65 fig. 1.

Remarks. The Coquette material of the Leiden Museum has already been dealt with by Holthuis (1958).

Type locality. Off Louisiana, U.S.A., 29° 24' 30" N 88° 01' W, 35 fms.

Distribution. North Carolina, northern Gulf of Mexico, Puerto Rico, Margarita Island (Venezuela), Suriname. The only previous Suriname record is the one by Holthuis (1958).

### **Hepatus pudibundus** (Herbst, 1785) (textfigs. 36, 37, 38 a, b)

#### Coquette Investigations

About 20 miles N. of the mouth of the Coppename River; depth 30 m; 1-5 April 1957; first voyage. — 3 males. (L)

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 6 males, 11 females. (L)

Between the mouths of the Nickerie and Suriname Rivers, 20 miles offshore; depth 27 m; 15-20 April 1957; third voyage. — 4 males, 2 females. (L)

20 miles N. of the mouth of the Marowijne River; depth 27 m; 23-27 April 1957; fourth voyage. — 3 males, 8 females (1 ovigerous). (L)

N.N.W. of the mouth of the Marowijne River, about 30 miles offshore; depth 37 m; 29 April-3 May 1957; fifth voyage. — 3 males, 3 females. (L)

15 miles N. of "Suriname Rivier" lightvessel; depth 18 m; 3 May 1957; fifth voyage. — 2 females. (L)

20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; sixth voyage. — 4 males, 13 females. (L)

Station 1, off the mouth of the Suriname River, 6° 22' N 55° 06' W; bottom mud; depth 26 m; 11 May 1957. — 1 male, 1 female. (W)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 3 males, 2 females. (L + W)

Station 15, N.E. of the mouth of the Suriname River, 6° 24.5' N 54° 59.5' W; bottom mud and shells; depth 29 m; 11 May 1957. — 1 male. (W)

Station 20, N.E. of the mouth of the Suriname River, 6° 28' N 54° 57.5' W; bottom shells; depth 31 m; 11 May 1957. — 1 female. (W)

Station 235, between the mouths of the Suriname and Marowijne Rivers, 6° 23.5' N 54° 29.5' W; bottom mud; depth 29 m; 15 June 1957. — 1 male, 1 female. (W)

#### Museum Leiden

Near "Suriname Rivier" lightvessel; bottom clay; trawled; depth 7 m; 12 January 1954; Suriname Fisheries Service. — 1 male, 1 female.

Description. Rathbun, 1937, p. 235, pl. 70 figs. 1, 2 (as *H. princeps*).

Remarks. The present material has cl. ranging between 16 and 55 mm in the males, between 14 and 46 in the females, while cb. ranges between 21 and

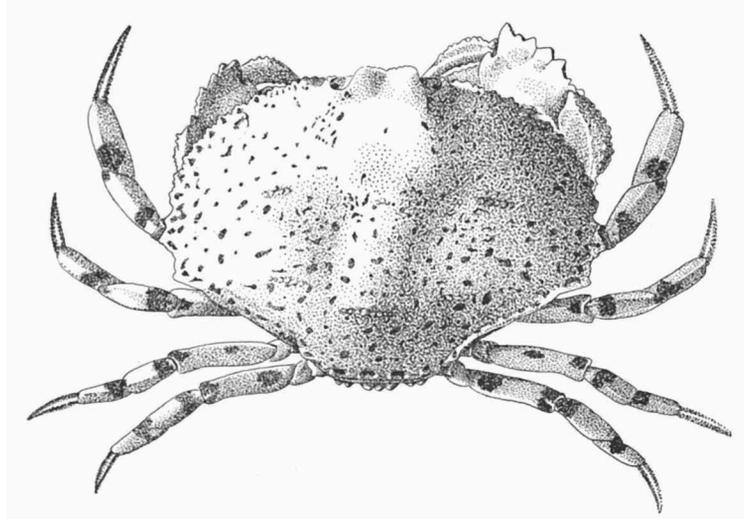


Fig. 36. *Hepatus pudibundus* (Herbst). Female in dorsal view. Specimen from second voyage of the "Coquette".  $\times 1.25$ . W. C. G. Gertenaar del.

76 mm in the males and between 18 and 62 mm in the females. The only ovigerous female has cl. 41 mm, cb. 55 mm. Several of the specimens carry one or more sea anemones on the carapace, one specimen some balanids.

Rathbun's (1937) account of this species is rather short, so that the discovery of two new related species makes it necessary to give here some additional details.

The carapace is 1.30 to 1.45 times as broad as long. In the juvenile specimens it is relatively somewhat narrower than in the adults. So in my specimens with cb. 20 to 30 mm the carapace is 1.30 to 1.40 times as broad as long,

while in the specimens with cb. 50 to 76 mm this ratio is 1.34 to 1.44. In the adults the surface of the carapace is almost smooth, only faint indications of

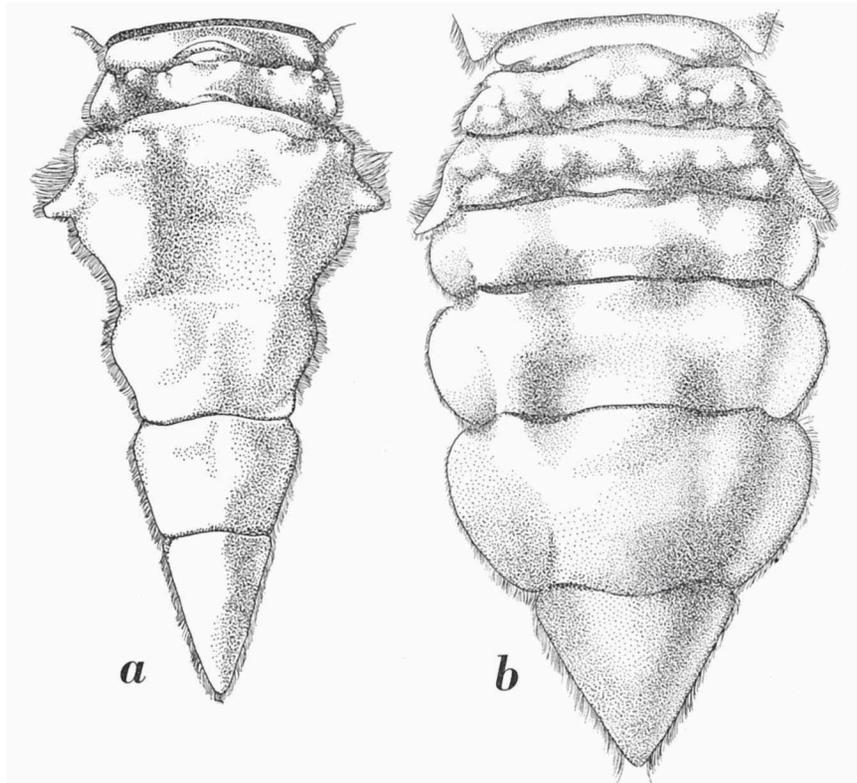


Fig. 37. *Hepatus pudibundus* (Herbst). a, abdomen of male; b, abdomen of female. Specimens from second voyage of the "Coquette". a, b,  $\times 4$ . W. C. G. Gertenaar del.

transverse rows of tubercles are visible. In the juveniles, however, there are eight very distinct short transverse rows of tubercles. Three of these lie in a transverse line in the broadest part of the carapace with two other rows in front, also in a transverse line, and three behind, similarly arranged. The larger the animals are, the less conspicuous the tubercles. The surface of the carapace is strongly convex, sloping down to all sides. The angle where the antero-lateral and postero-lateral margins meet is not very distinct and the one passes gradually into the other. As a rule this angle lies behind the broadest part of the carapace. The anterior part of the postero-lateral margin consists of a double row of tubercles; the two rows are placed side by side without any space in between, the outer row consisting of very inconspicuous tubercles. In the middle of this double row there is a rather distinct tooth, while furthermore a small tooth is present in the posterior part of the postero-lateral margin of the carapace.

In the adult female all abdominal segments are free. The telson is triangular, being about as long as broad. The sixth segment is distinctly broader

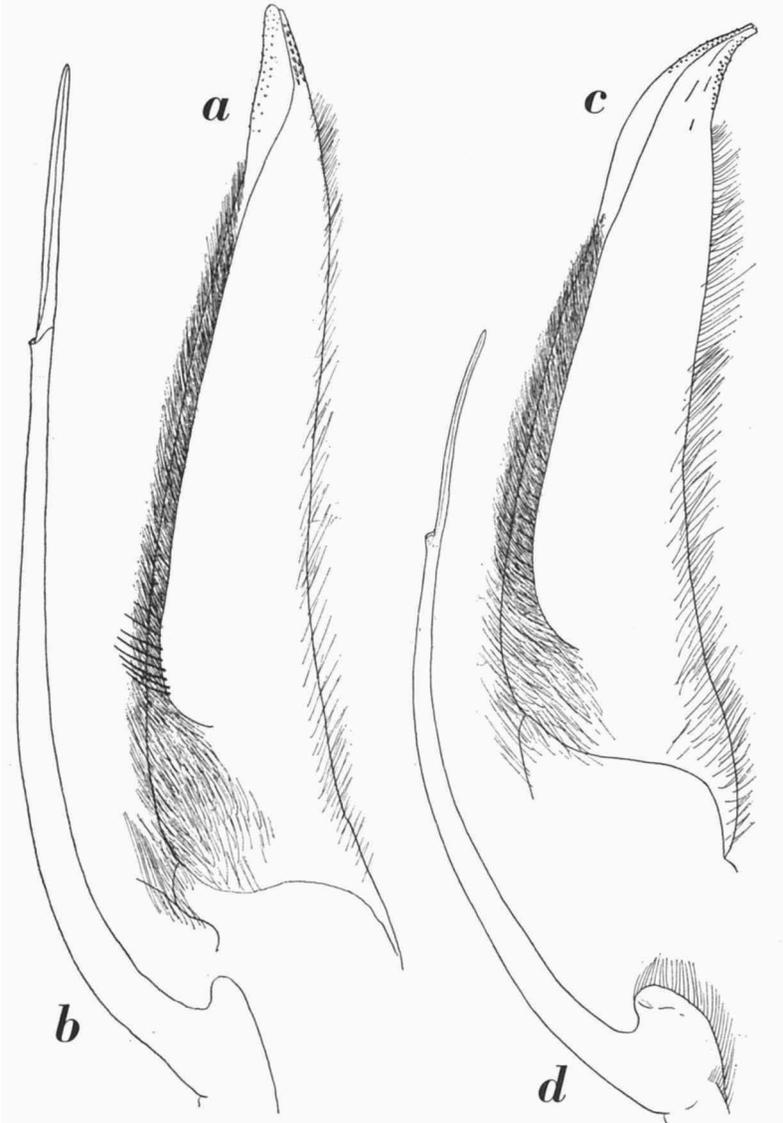


Fig. 38. *Hepatus pudibundus* (Herbst), male specimen from second voyage of the "Coquette". a, first pleopod; b, second pleopod. *Hepatus scaber* new species, male paratype from second voyage of the "Coquette". c, first pleopod; d, second pleopod. a-d,  $\times 16$ .

than the telson and has the lateral margin convex, forming a kind of pleura. Similar pleurae are also visible in the third, fourth, and fifth segments. The

sixth segment is about as long as the telson, but longer than the fifth: the segments become gradually narrower and shorter from the sixth to the first. The pleurae of the third segment are in the form of an acute process which is directed obliquely distally. In the middle of the second and third segments there is a transverse ridge, which is provided with some rather distinct blunt teeth. In the young females the abdomen is far narrower, more closely resembling that of the male. The abdomen of the male is naked except for a short pubescence on the lateral margins; the outline of the abdomen thereby is distinctly visible. The telson is elongate triangular. It is distinctly longer than broad and furthermore is longer than the sixth abdominal segment. The posterior margin of the telson is practically straight. The sixth segment has the anterior breadth about equal to the length of the segment. The lateral margins diverge proximally to converge again close near the base of the segment. Both the anterior and the posterior margins of the segment are straight. The third, fourth, and fifth segments of the male abdomen are fused. The fifth segment is about as long as, but broader than the sixth, it narrows anteriorly; the lateral margins are slightly concave in the distal half, distinctly convex in the proximal part. The fourth segment is of about the same shape as the fifth, but is still broader. Its exposed surface is practically flat. The third segment shows a transverse somewhat tuberculated ridge; the lateral margins just before the base of the fourth segment are produced to a narrow process, which is directed obliquely distally. The second segment is rather narrow and short; it bears a transverse tuberculated ridge.

When the third maxillipeds are in their normal position covering the oral field, their flattened tips, which then lie side by side, are situated in a single plane and do not meet each other under an angle as in the next species.

The dactyli of the walking legs are covered with a very short pubescence, which leaves the tip and a narrow longitudinal area over the anterior and posterior surface naked. None of the other segments of the legs show any pubescence at all. The carpus and propodus show two dorsal ridges, which sometimes are rather indistinct.

The first pleopods of the male are robust, straight and end in a tip which is directed forwards or slightly inwards. The second pleopods are very narrow and straight; they reach slightly beyond the first.

Colour. The carapace has a conspicuous colour pattern formed by small dots, which in preserved material have a reddish colour. These dots are sometimes arranged to conspicuous transverse bands or lines, but may also be scattered over the surface of the carapace without forming a distinct pattern. In the posterior part of the carapace these dots are larger than anteriorly. Similar dots are visible on the upper part of the carpus and the palm of

the chelipeds. The walking legs have two conspicuous broad bands of a reddish colour, one in the proximal part and one distally on the merus, while the carpus and the propodus each have one such band, which is situated proximally. The bands of the merus are very distinct in the last leg, but less so in the preceding.

The species was described for the first time by L. T. Gronovius (1764, p. 223) as *Cancer* 960. Gronovius's diagnosis runs as follows: "Cancer thorace latiusculo convexo laevi, undique emarginato crenato, postice contractiore pedes non contegente: manibus cristatis. Martinicensibus *Crabe honteuse & crête de Cocq.*" In his description the species is compared with *Calappa* from which it should mainly differ "absentiâ velorum thoracis pedes posticos obtegentium". The posteriorly contracted carapace, the resemblance in other respects (e.g., in the chelipeds) to *Calappa* and the locality Martinique, show that Gronovius's animal can be nothing but a species of either of the genera *Hepatus* and *Cycloes*. The expression "thorace latiusculo" shows that *Hepatus* and not *Cycloes* is meant. The remark "thorax . . . superne est convexus, laeviusculus, punctulis prominulis hic illic scaber" in Gronovius's description very correctly describes the situation as it is found in the present species, being different from that in *Hepatus epheliticus* (L.), which seems not to be "punctulis prominulis hic illic scaber", while the two species described below as new in no way can be said to have the carapace "laeviusculus". Since the present species is the most common of the West Indian *Hepatus* species and since Gronovius's description fits it in all respects, there is no good reason not to consider *Cancer* 960 of Gronovius to be identical with it.

Gronovius did not give the species a scientific name. The first such name given to it was *Cancer arenarius*, which Meuschen published twice: first in 1778 in *Museum Gronovianum* (p. 84) and secondly in 1781 in the index to Gronovius's *Zoophylacium Gronovianum*. Both these works, however, have been rejected for nomenclatorial purposes by the International Commission on Zoological Nomenclature: *Museum Gronovianum* in *Opinion* 260 (1954, *Opin. Decl. Int. Comm. zool. Nomencl.*, vol. 5, pp. 265-280<sup>1)</sup>), the *Index* in

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1) From a bibliographic point of view it is interesting to note that the title page of the copy of the *Museum Gronovianum* seen by me, a copy in the possession of the Royal Library in The Hague, differs from the title page as given in *Opinion* 260. The first 23 lines of the title are exactly identical in the two title pages. In line 24 of the Hague copy the word "aliorvmqve" is printed with a q instead of with a g. Line 25 is again the same in both copies, but line 26 and following in the Hague copy are as follows: "CVRA // F.C.M. //—// LVGDVNI BATAVORVM // APVD Th. HAAK & SOCIOS J. MEERBURG. BIBLIOPOLAS. // MDCCLXXIIX." The names of the two booksellers are placed in two lines, one above the other with brackets in front and behind;

Opinion 261 (1954, Opin. Decl. Int. Comm. zool. Nomencl., vol. 5, pp. 281-296). Meuschen's names therefore cannot be used. The next name given to the species is that of *Cancer pudibundus*, first published by Herbst (1785, vol. 1, p. 199), who under this name gave a German translation of Gronovius's description of Cancer 960. This is the oldest available and valid specific name for the present species and consequently has to be used for it. In 1794 Herbst (1794, vol. 2, p. 154, pl. 38 fig. 2) described the species for a second time as new, basing himself this time on a specimen from his own collection. At this occasion Herbst proposed the name *Cancer princeps* for the species, which name has been adopted by several authors. Four years later the species was again described as new, when Fabricius (1798, p. 347) published his description of *Calappa angustata*. This description, though short, can only refer to the present form. The fact that Fabricius mentioned that the legs are "albidi fasciis violaceis" excludes the next two species, and as no mention is made of a striking colour pattern of the carapace, his species cannot be *Hepatus epheliticus* either. Latreille (1802-1803a, p. 388) after describing the genus *Hepatus*, gave the present species the new name *H. fasciatus*, citing *Calappa angustata* Fabr. in the synonymy and referring to Herbst's (1794) description and figure of *Cancer princeps*; furthermore Latreille gave a recognisable figure of the species and indicated that he considered it to be identical with Cancer 960 of Gronovius. In 1818 Lamarck (p. 268) proposed the new name *Hepathus calappoides* citing the above mentioned names given by Herbst (1794), Fabricius (1798), and Latreille (1802-1803a) as synonyms. A juvenile specimen of the present species formed the base for De Saussure's (1858) description of *Hepatus tuberculatus*, which therefore has to be added to the already long list of synonyms of *Hepatus pudibundus*.

Not only the nomenclature of the specific name causes difficulties, but also that of the generic name is rather complicated. The generic name *Hepatus* was proposed by Latreille (1802-1803, p. 22), the type species is *Calappa angustata* Fabricius, 1798. Some authors considered the name *Hepatus* Latreille to be preoccupied by either *Hepatus* Gronovius, 1763, or by *Hepatus* A. F. Röse, 1793, both names proposed for a genus of fishes. But neither Gronovius's work (*Zoophylacium Gronovianum*, vol. 1) nor that by Röse (Artedi, *Bibl. ichthyol.*, ed. 2 vol. 4) is binominal and therefore these names are unavailable nomenclatorially. I do not know of any valid use of the generic name *Hepatus* before that by Latreille, which therefore must be considered

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the word *apud* is printed in front of the middle of the first bracket and *bibliopolas* in the same way behind the second. This second title page shows that *Museum Gronovianum* not only has been sold as a sales catalogue but also as a book.

to be the valid name for the present genus. Two substitute names have been proposed for *Hepatus* Latreille by authors who thought this name preoccupied. These names are *Hepatulus* Fowler (1912, p. 590) and *Hepatoides* Balss (1957, p. 1612).

Type locality. Martinique.

Distribution. East American coast between Georgia (U.S.A.) and Brazil. Herbst (1794) reported his *Cancer princeps* from "Ostindien", which evidently is erroneous, as so many of the localities cited by Herbst. Herklots (1861, p. 139) reported "*Hepatus fasciatus*" from "Cape de bonne Espér."; his specimen, which is still preserved in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden, consists of a dry carapace of the present species with the indication "Cap". The latter is evidently incorrect as no species of *Hepatus* is known from the region of the Cape of Good Hope. Rathbun (1937, pp. 235, 237) reported *Hepatus princeps* from West Africa (Guinea). Monod (1956, p. 115) showed that Rathbun's record is extremely doubtful, being only based on a very old and probably incorrectly labelled specimen of this species, preserved in the collection of the Copenhagen Museum.

The species is now recorded for the first time from Suriname.

### ***Hepatus scaber*** new species (textfigs. 38c, d, 39, 40)

#### Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 12 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 2 males, 1 female. (L)

20 miles N. of the mouth of the Marowijne River; depth 27 m; 23-27 April 1957; fourth voyage. — 2 males. (L)

15 miles N. of the mouth of the Suriname River; depth 18 m; 3 May 1957; fifth voyage. — 2 females. (L)

20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; sixth voyage. — 6 males, 2 females. (L)

Station 1, off the mouth of the Suriname River, 6° 22' N 55° 06' W; bottom mud; depth 26 m; 11 May 1957. — 1 female. (W)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 10 males, 3 females. (W)

Station 20, N.E. of the mouth of the Suriname River, 6° 28' N 54° 57.5' W; bottom shells; depth 31 m; 11 May 1957. — 1 male. (W)

Station 24, N.E. of the mouth of the Suriname River, 6° 23.5' N 55° 00' W; bottom mud and shells; depth 27 m; 12 May 1957. — 1 male. (W)

Station 69, off N.W. French Guiana, 5° 58.5' N 53° 25' W; bottom coral and shells; depth 29 m; 21 May 1957. — 1 male (L)

Station 85, N. of Isle du Salut, French Guiana, 5° 50.5' N 53° 10' W; bottom mud and shells; depth 27 m; 22 May 1957. — 3 males, 2 females (1 ovigerous). (L)

Station 159, off the mouth of the Suriname River, 6° 22' N 55° 02.5' W; bottom mud; depth 26 m; 4 June 1957. — 1 female. (W)

Station 287, N.E. of the mouth of the Coppename River, 6° 52' N 55° 50' W; bottom mud, shells and coral; depth 48 m; 26 June 1957. — 1 male. (W)

Description. The present species remains smaller than *H. pudibundus*. The males of *H. scaber* examined have the carapace lengths ranging between 8 and 27 mm and the breadths between 11 and 36 mm; in the females cl.

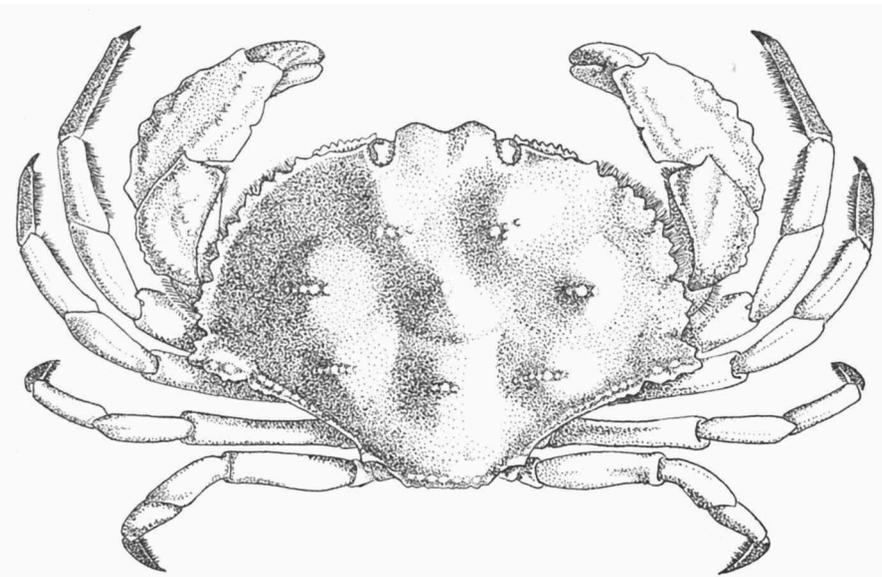


Fig. 39. *Hepatus scaber* new species. Male paratype from "Coquette" Sta. 85.  $\times 2$ . W. C. G. Gertenaar del.

ranges between 10 and 21 mm and cb. between 12 and 26, in the ovigerous female cl. is 18, cb. 24 mm. The ratio of breadth and length of the carapace varies between 1.24 and 1.37, being usually 1.33.

In all stages of this species eight distinct tubercles which bear granules are visible on the carapace. These tubercles are similarly arranged as in the juvenile specimens of the previous species. Each tubercle bears a single large central granule, around which there are several smaller; in the posterior three tubercles the granules are more or less distinctly placed in a transverse row. Compared to *H. pudibundus* the carapace is far less convex, being flattened dorsally and even somewhat concave near the lateral margins. The front is narrower and more deeply incised than in *H. pudibundus*, while it also projects farther beyond the orbits. The angle where the antero-lateral and postero-lateral margins of the carapace meet is very distinct and projects beyond the antero-lateral margin, the carapace being widest at this point. The anterior part of the postero-lateral margin consists, like in *H. pudibun-*

*dus*, of two rows of granules; in the present species the granules of the outer row are of the same size as those of the inner row. The two rows are separated by a narrow but distinct space. The tooth in the middle of the double row and that near the base of the postero-lateral margin are more distinct than in *H. pudibundus*.

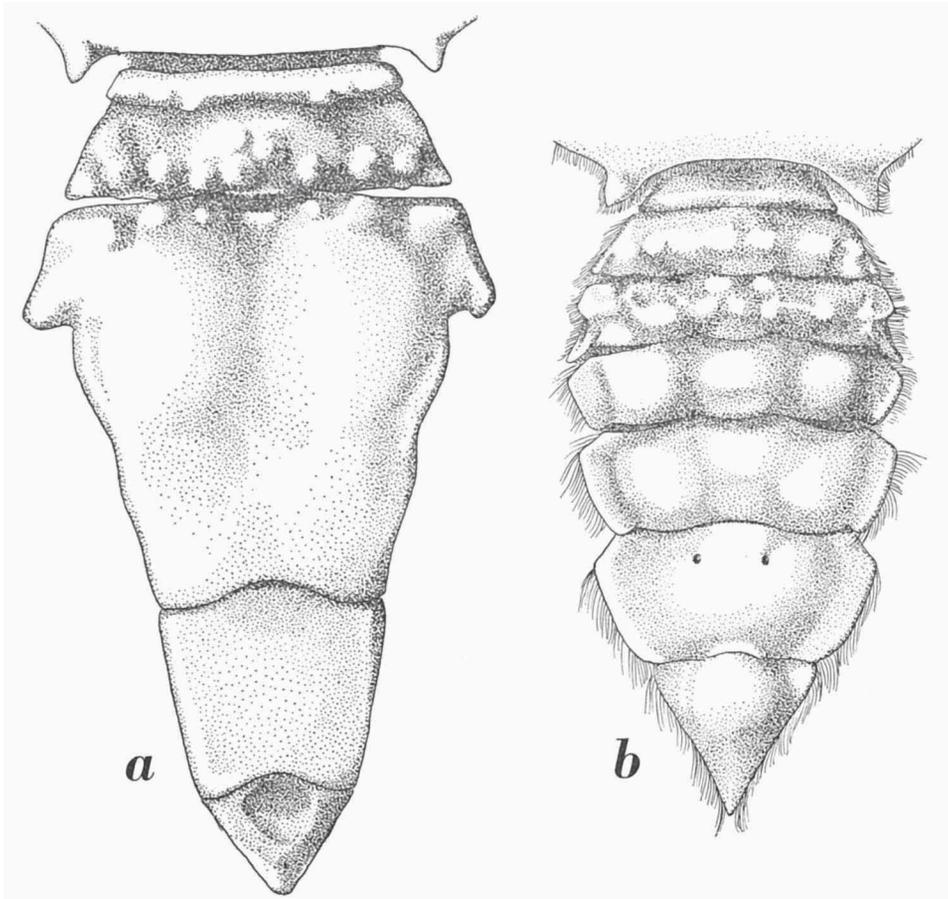


Fig. 40. *Hepatus scaber* new species. a, abdomen of male; b, abdomen of female. a, specimen from second voyage of the "Coquette" b, specimen from "Coquette" Sta. 85. a,  $\times 9$ ; b,  $\times 7.5$ . W. C. G. Gertenaar del.

In the female the abdominal segments are free. The telson is somewhat longer than broad, being narrower than in *H. pudibundus*, especially so in the distal part; the tip is very narrow. The abdominal segments are narrower than in the previous species; the third to sixth have a rather distinct groove separating the pleural part from the body of the segment, and on the exposed

surface have a velvety pubescence. The segments diminish in length from the sixth to the first. The third and second segments are as in *H. pudibundus*, but the teeth on the transverse ridges are very indistinct.

The abdomen of the male shows a dense grayish brown velvety pubescence, which is especially conspicuous distally. This pubescence merges with the pubescence of the thoracic sternum so that when the abdomen is carried in the normal position its outline is extremely indistinct. The telson is about equilaterally triangular, being somewhat broader than long, it is shorter than the sixth abdominal somite. The surface of the telson is not smooth, but shows a low and blunt elevation in the middle. On this elevation a tuft of long coarse, posteriorly directed hairs is implanted. The proximal margin of the telson is distinctly convex. The distal breadth of the sixth somite is about equal to its length. The distal margin of this segment is concave, the proximal convex; the lateral margins are slightly convex. The fifth segment is shorter than the sixth. The lateral margins are almost straight, being only slightly convex in the basal part. The fourth segment is of the same shape as the fifth, but broader; it is somewhat swollen in its lateral parts and has a median longitudinal groove. The second and third segments are as in the previous species. The thoracic sternum is densely velvety pubescent. In the males there is a naked deep median longitudinal groove extending from the tip of the telson forwards.

When the third maxillipeds are in their normal position, the flattened tips form an angle with one another, the inner part being curved ventrally.

The chelipeds do not differ much from those of the previous species. The palm shows a distinct pubescent strip along the lower margin of the inner surface, which is continued on the base of the fixed finger.

The dactyli of the walking legs, except for the extreme tip, are pubescent. This pubescence is especially long on the lower surface of the second and third pereopods (= first and second walking legs), much longer than in *H. pudibundus*. The distal part of the lower margin of the propodus and the proximal part of the lower margin of the merus of the second and third pereopods also show a distinct pubescence. In the females and the smaller males such a pubescence is to be seen also on the propodus of both the fourth and fifth pereopod, and on the merus of the fourth. The dorsal ridges on the propodus and carpus of the walking legs are rather indistinct.

The first pleopods of the male are robust, straight, and end in a pointed tip, which is directed outwards and has a yellowish horn colour. The second pleopods of the male are very slender, and curved slightly outwards, they fail to reach the end of the first pleopods.

Colour. No distinct colour pattern is visible on the carapace or on the legs;

these are of a rather uniform coloration. Sometimes the carapace shows a poorly defined reddish mottling.

Remarks. The species might at first sight be mistaken for a juvenile of *H. pudibundus*, but it is readily to be distinguished by the flatness of the carapace, its outline, the hairy ventral surface, the shape of the abdomen, the pubescence of the legs, and the outward curved shape of the male pleopods.

Type. Holotype is the larger male specimen (cb. 30 mm) collected during the fourth voyage of the "Coquette" (Mus. Leiden, Reg. No. Crustacea D 12139).

### **Hepatus gronovii** new species (textfigs. 41-43)

#### Coquette Investigations

Station 85, N. of Isle du Salut, French Guiana, 5° 50.5' N 53° 10' W; bottom mud and shells; depth 27 m; 22 May 1957. — 3 males. (L)

Description. The specimens have the cl. varying from 24 to 25.5 and the cb. from 33.5 to 35 mm. The carapace is 1.37 to 1.40 times as broad as long. Its surface shows

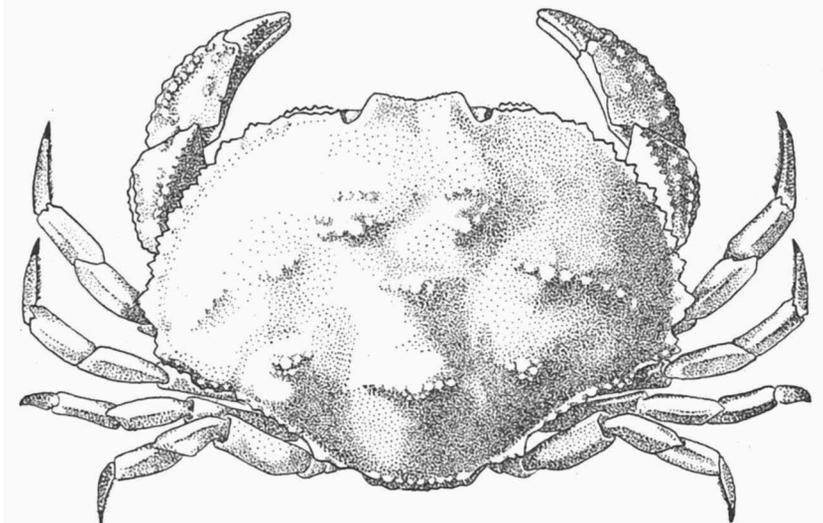


Fig. 41. *Hepatus gronovii* new species, male paratype.  $\times 2$ . W. C. G. Gertenaar del.

eight conspicuous tubercles, which are similarly arranged and of a similar shape as in the previous species. In this new species the granules of the lateral tubercles of the second row, like those of the three tubercles of the last row, are arranged in distinct transverse series. The surface of the carapace is strongly convex, much as in *H. pudibundus*, and totally different from *H. scaber*. The angle under which the antero-lateral and postero-lateral margins of the carapace meet is not very conspicuous and does not strongly differ from the preceding or from the following tooth. This angle does not reach beyond the extreme lateral point of the carapace, which is formed by the tooth preceding the lateral angle. The greatest breadth of the carapace thus lies distinctly before the angle formed by the antero-lateral and postero-lateral margins. The ante-

rior part of the postero-lateral margin consists of two rows of tubercles, which are placed so close together that there is no space left in between; the tubercles of the

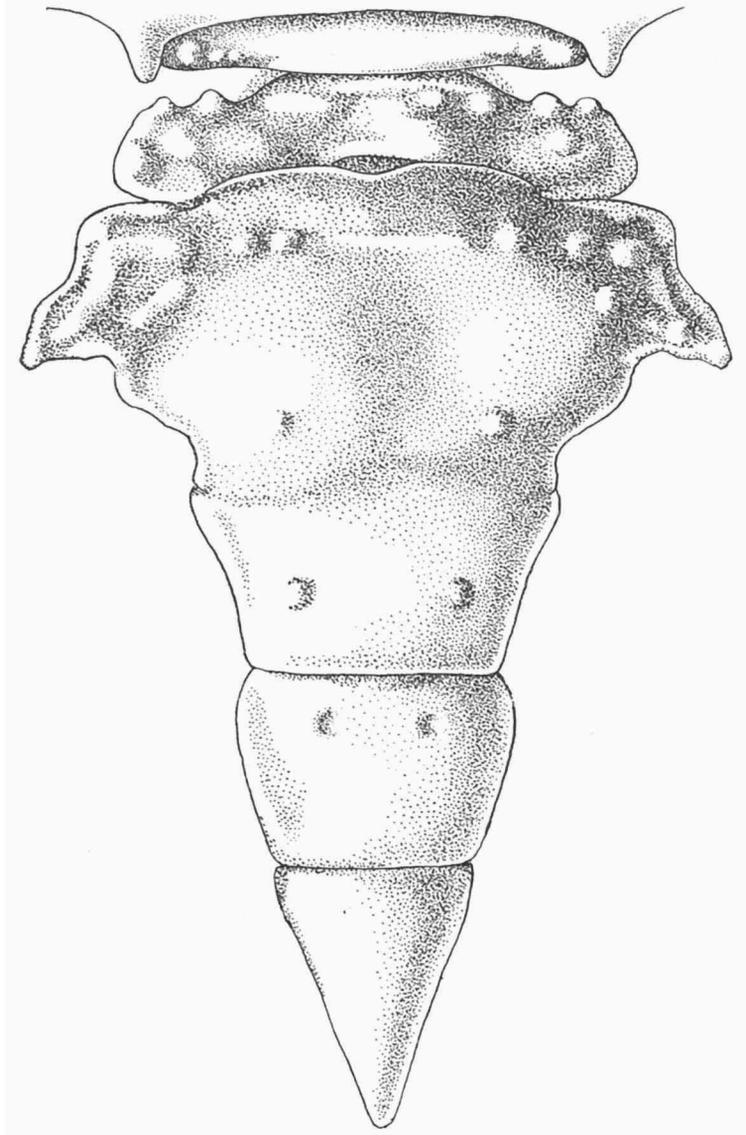


Fig. 42. *Hepatus gronovii* new species. Abdomen of male paratype.  $\times 10$ .  
W. C. G. Gertenaar del.

outer row are slightly smaller than those of the inner. There is a distinct tooth in the middle of the double row, and another may be seen in the posterior part of the postero-lateral margin. These teeth are better developed than in *H. pudibundus*.

The tips of the third maxillipeds are as in *H. pudibundus*, but for the distal margin, which is not emarginate.

The dactyli of the walking legs are covered by a short pubescence, the long ventral hairs as shown by *H. scaber* are lacking here. There are no distinct naked areas on the dactyli, though a trace of such an area may be observed in the basal part. The

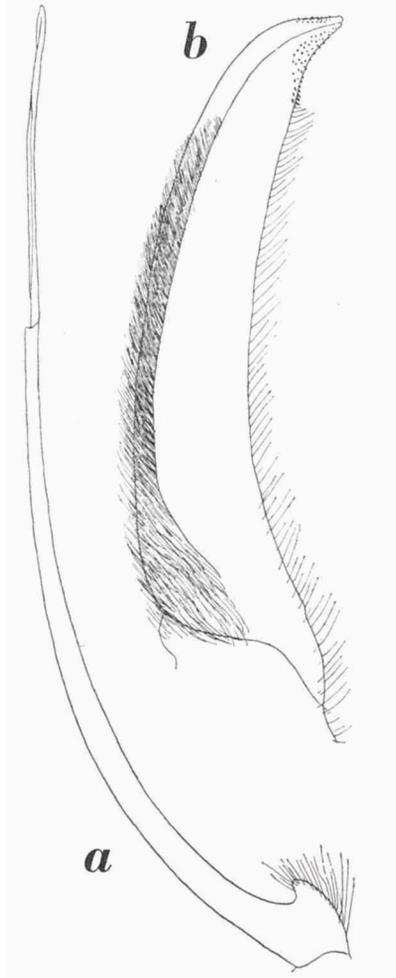


Fig. 43. *Hepatus gronovii* new species, male paratype. a, first pleopod; b, second pleopod. a, b,  $\times 16$ .

lower surface of the propodus of the second and third pereiopods shows two longitudinal lines of a short pubescence: one of these lines is placed along the anterior, the other along the posterior margin of this surface. This pubescence does not extend all the way to the base of the propodus. In the fourth pereiopod there is a single strip of pubescence in the distal part of the lower surface of the propodus, while no pubescence is to be seen on the propodus of the last leg. The lower surface of the ischium and the extreme basal part of the lower surface of the merus of the walking legs show some

pubescence, which is far less pronounced in the posterior legs than in the anterior. The carpus of the walking legs bears two dorsal carinae, the propodus one or two, which are not always distinct.

In my male specimens the abdomen is pubescent, but far less densely so than in *H. scaber*. The telson lacks the posteriorly directed tuft of long hairs. The outline of the abdomen is distinctly visible. The telson is elongate triangular and is decidedly longer than broad; it is slightly longer than the sixth abdominal segment. The basal margin of the telson is practically straight. The distal breadth of the sixth abdominal somite is somewhat shorter than the length of the somite, which is relatively longer than in *H. pudibundus*. The lateral margins are almost straight, being slightly convex in their basal part. Both the posterior and the anterior margins of this somite are straight. The third to fifth somites are fused. The fifth is slightly shorter than the sixth; it broadens posteriorly, having the lateral margins concave in its distal half, convex in its proximal half. The distal part of each half of the exposed surface shows a distinct tubercle at some distance from the lateral margins. The fourth somite is shorter and broader than the fifth but has the same general shape; the curves of the lateral margins are more pronounced than in the fifth somite; the exposed surface shows similar tubercles as in the preceding somite. Both the third and second somites are provided with a distinctly tuberculated transverse ridge. The lateral margins of the third somite show an obliquely outwards directed elongate process. Unfortunately no female specimens are available.

The first pleopods of the male are robust and resemble those of *H. scaber* by having the top curved outwards; this top, however, is less slender than in the previous species. The second pleopods are slender and straight; they reach distinctly beyond the first pair.

Colour. No colour pattern was observed in the present material.

In several respects the present new species is intermediate between *H. pudibundus* and *H. scaber*. The shape and sculpturation of the carapace, the pubescence of the walking legs, the shape of the abdomen and that of the male pleopods may serve as an easy means for a rapid identification of the species.

*Hepatus gronovii* is named in honour of Laurentius Theodorus Gronovius (also written Gronov, Gronow, or Gronouw) who was born at Leiden in 1730 as the son of the well-known botanist Dr. Johannes Fredericus Gronovius, the author of "Flora Virginica" and friend of Linnaeus. L. T. Gronovius studied law at Leiden University and after obtaining his degree became "Raadsheer en Schepen" (justice and alderman) of the town of Leiden. He died there in 1777 or 1778. Though Gronovius was not a professional biologist he was highly interested in that branch of science and devoted much of his spare time to the study of natural history, becoming especially well known as an ichthyologist. Several scientific societies like those of Basle, London and Haarlem recognized his merits by electing him as a member. In the field of carcinology Gronovius did much important work and in his *Zoophylacium Gronovianum* he published many interesting additions to the knowledge of Crustacea: he was the first zoologist to describe a species of the present genus (*H. pudibundus*). Unfortunately Gronovius did not adopt the system of binominal nomenclature, so that the names given by him are not valid.

Holotype is the largest of the three specimens, Museum Leiden Reg. No. Crustacea D. 12354.

Family Leucosiidae

Subfamily Philyrinae

***Persephona lichtensteinii* Leach, 1817**

Coquette Investigations

About 20 miles N.N.W. of the mouth of the Coppename River; depth 31 m; 1-5 April 1957; first voyage. — 1 male, 2 females. (L)

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 female. (L)

20 miles N. of the Suriname coast between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 male. (L)

N.N.W. of the mouth of the Marowijne River, 20 miles offshore; depth 27 m; 29 April-3 May 1957; fifth voyage. — 1 female. (L)

15 miles N. of "Suriname Rivier" lightvessel; depth 18 m; 3 May 1957; fifth voyage. — 2 males. (L)

20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; sixth voyage. — 3 males, 8 females (1 ovigerous). (L)

Station 1, off the mouth of the Suriname River, 6° 22' N 55° 06' W; bottom mud; depth 26 m; 11 May 1957. — 3 males. (W)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 2 males. (W)

Station 6, off the mouth of the Suriname River, 6° 24.5' N 55° 03' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 male. (W)

Station 15, N.E. of the mouth of the Suriname River, 6° 24.5' N 54° 59.5' W; bottom mud and shells; depth 29 m; 11 May 1957. — 2 females. (W)

Station 62, off N.W. French Guiana, 6° 02' N 53° 41' W; bottom shells; depth 26 m; 21 May 1957. — 2 females. (L)

Station 66, off N.W. French Guiana, 6° 00' N 53° 29' W; bottom hard mud; depth 27 m; 21 May 1957. — 3 males, 2 females. (L)

Station 75, off N.W. French Guiana, 5° 56' N 53° 17' W; bottom mud and shells; depth 29 m; 21 May 1957. — 7 males, 10 females. (L)

Station 157, off the mouth of the Suriname River, 6° 22' N 55° 03.5' W; bottom mud; depth 24 m; 4 June 1957. — 1 male. (W)

Description. Rathbun, 1937, p. 163, pl. 45 figs. 1, 2.

Remarks. The carapace lengths of the above specimens vary between 13 and 32 mm, in the ovigerous female it is 22 mm. The length and acuteness of the various spines on the carapace is subject to considerable variation. In some specimens the hepatic and lateral spines are pointed and slender, in others they are blunt, and even may be rather obsolete. The tubercle between the hepatic and lateral spine may be distinct or hardly discernable. Generally the median posterior spine is distinctly longer than the other two, but there are specimens in which the three spines are subequal in length. In some specimens the granulation of the carapace is coarser than in others. In the anterior part of the dorsal surface of the carapace a soft and sparse pubescence is present. The abdomen in the males has sometimes the sixth segment distinctly separated from the fifth, but in other specimens the line of separation is extremely vague, so that it seems as if the third to sixth segments were fused.

The main feature on which Rathbun (1937) seems to separate *Persephona finneganæ* Rathbun from *P. lichtensteinii* is the fact that the tubercle between the hepatic and lateral spines of the carapace is present in the former and absent in the latter species. As is shown by my material this character is very variable. On comparing my material with Rathbun's accounts of the

two species, I cannot escape the impression that *P. finneganae* falls within the range of variation of *P. lichtensteinii* and should be synonymized with that species.

Type locality. Unknown. Of *P. finneganae* the type locality is São Sebastião, Brazil.

Distribution. Haiti, Trinidad, Brazil. The species is now reported for the first time from Suriname and French Guiana.

***Persephona punctata*** (Linnaeus, 1758)

Coquette Investigations

20 miles N. of the coast of Suriname between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 2 females. (L)  
15 miles N. of "Suriname Rivier" lightvessel; depth 18 m; 3 May 1957; fifth voyage. — 1 male. (L)

20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; sixth voyage. — 2 males. (L)

Description. Rathbun, 1937, p. 152, pl. 42 figs. 2, 3.

Remarks. The carapace lengths of the specimens range between 19 and 30 mm.

Linnaeus's (1758, p. 630) description of the species runs as follows:

"C[ancer]. brachyurus, thorace obovato punctato: postice tridentato.

*Rumph. mus. t. 10. f. C. Brown. jam. t. 42. f. 3.*

*Habitat in Asia, America."*

As Browne figured the present species and Rumphius represented *Myra fugax* (Fabr.), Linnaeus's *Cancer punctatus* is composite. Fabricius (1798, pp. 350, 351) was the first to distinguish the American from the Indo-West Pacific species; he gave the name *Leucosia fugax* to the latter, using the name *L. punctata* for the American form. As far as I know no definite lectotype selection has ever been made for *Cancer punctatus*, so that its identity is not yet officially fixed. Therefore I select now, in harmony with current usage, the specimen figured by Browne (1756, p. 422, pl. 42 fig. 3) as the lectotype of *Cancer punctatus* Linnaeus, 1758.

Type locality. "Habitat in Asia, America". By the above lectotype selection the type locality is now restricted to Jamaica, British West Indies.

Distribution. West Indies to Brazil; a subspecies *P. p. aquilonaris* Rathbun is known from the coasts of the U.S.A. (New Jersey to Texas). No Suriname records of this species have so far been published.

Subfamily Leucosiinae

***Iliacantha liodactylus*** Rathbun, 1898

Coquette Investigations

N.N.W. of the mouth of the Marowijne River, 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 8 males, 4 ovigerous females. (L)

Station 3, off the mouth of the Suriname River, 6° 24' N 55° 05' W; bottom shells; depth 27 m; 11 May 1957. — 1 female. (L)

Station 4, off the mouth of the Suriname River, 6° 25' N 55° 05' W; depth 29 m; 11 May 1957. — 2 females. (L)

Station 5, off the mouth of the Suriname River, 6° 25' N 55° 04' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 male, 1 female. (L)

Station 33, N.E. of the mouth of the Suriname River, 6° 52' N 54° 53' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 male. (W)

Station 290, off the mouth of the Coppename River, 6° 53' N 55° 55' W; bottom mud, shells, and coral; depth 49 m; 27 June 1957. — 1 female. (L)

Description. Rathbun, 1937, p. 186, textfig. 41, pl. 55.

Remarks. The carapace lengths of the present material vary between 13 and 33 mm, in the ovigerous females they range between 28 and 31 mm.

Rathbun (1937) stated in her key on p. 185 that in the present species the median spine of the posterior margin of the carapace is twice as long as those of the lateral pair, while on p. 187 she remarked "lateral pair two-thirds the length of the median spine". In my specimens the median spine as a rule is only slightly longer than the laterals and in not a single instance it attains a length of more than 1.5 times that of the laterals.

Type locality. North of Trinidad, British West Indies (10° 37' 40'' N 61° 42' 40'' W and 10° 37' 00'' N 61° 44' 22'' W); depth 31 and 34 fathoms.

Distribution. West Florida, Haiti, Puerto Rico, St. John, Trinidad. The species is now reported for the first time from Suriname.

#### Family Raninidae

### **Raninoides laevis** (Latreille, 1825)

#### Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 2 specimens. (L)

Description. Rathbun, 1937, p. 8, textfig. 3, pl. 1 figs. 1, 2.

Remarks. The present specimens (cl. 25 and 30 mm) agree perfectly with Rathbun's description.

Type locality. Unknown.

Distribution. S. and W. Florida, Pacific coast of Panama, Atlantic and Pacific coast of Colombia, Barbados. The species is now reported for the first time from Suriname.

#### Section Oxyrhyncha

#### Family Majidae

### **Stenorhynchus seticornis** (Herbst, 1788)

#### Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 male. (L)

20 miles N. of the Suriname coast between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 female. (L)

Station 5, off the mouth of the Suriname River, 6° 25' N 55° 04' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 male. (L)

Station 8, off the mouth of the Suriname River, 6° 24' N 55° 02.5' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 2 ovigerous females. (L)

Station 28, N.E. of the mouth of the Suriname River, 6° 48' N 54° 54' W; bottom shells; depth 46 m; 12 May 1957. — 2 males. (W)

Station 29, N.E. of the mouth of the Suriname River, 6° 49' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 1 ovigerous female. (W)

Station 32, N.E. of the mouth of the Suriname River, 6° 51' N 54° 53.5' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 ovigerous female. (W)

Station 33, N.E. of the mouth of the Suriname River, 6° 52' N 54° 53' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 male. (W)

Station 36, N.E. of the mouth of the Suriname River, 6° 55' N 54° 54' W; bottom mud; depth 55 m; 12 May 1957. — 1 male. (W)

Description. Rathbun, 1925, p. 13, pls. 2, 3.

Remarks. The examined specimens have the carapace lengths ranging between 20 and 40 mm, in the ovigerous females it is 23 and 24 mm.

Type locality. "*Oost-Indien*" (Slabber, 1778, p. 162). This locality indication is incorrect as the species does not occur in the Indo-West Pacific area; evidently Slabber's animal (on which Herbst based his species) was incorrectly labelled. As Herbst (1803, vol. 3 pt. 3, p. 27) later brought a specimen from Guadeloupe to his *Cancer seticornis*, the locality Guadeloupe is chosen here as the corrected type locality of Herbst's species.

Distribution. Western Atlantic from Bermuda and North Carolina (U.S. A.) to Brazil and the West Indies; eastern Atlantic from Madeira and the Canary Islands to Angola. The species was hitherto not known from Suriname.

### ***Podochela gracilipes* Stimpson, 1871**

#### Coquette Investigations

Station 289, N.E. of the mouth of the Coppename River, 6° 52.5' N 55° 53' W; bottom mud and fine shells; depth 49 m; 27 June 1957. — 1 ovigerous female. (L)

Description. Rathbun, 1925, p. 47, textfig. 12, pl. 17.

Remarks. Unfortunately the present specimen, which has cl. 10 mm, lacks all the legs, but the characters offered by the carapace are such that there can be little doubt that it belongs to the present species.

Type localities. West of Tortugas, off Pacific Reef, and off Carysfort Reef, Florida, U.S.A.; depth 36 to 60 fathoms.

Distribution. East coast of America from North Carolina (U.S.A.) to Brazil. The species is now reported for the first time from Suriname.

**Anasimus latus** Rathbun, 1894

## Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 male, 1 ovigerous female. (L)

Station 5, off the mouth of the Suriname River, 6° 25' N 55° 04' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 male, 1 female. (L)

Station 8, off the mouth of the Suriname River, 6° 24' N 55° 02.5' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 male, 2 ovigerous females. (L)

Station 28, N.E. of the mouth of the Suriname River, 6° 48' N 54° 54' W; bottom shells; depth 46 m; 12 May 1957. — 1 male. (W)

Station 31, N.E. of the mouth of the Suriname River, 6° 50' N 54° 53.5' W; bottom hard mud and shells; depth 49 m; 12 May 1957. — 1 male. (W)

Station 32, N.E. of the mouth of the Suriname River, 6° 51' N 54° 53.5' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 male, 2 females. (W)

Station 33, N.E. of the mouth of the Suriname River, 6° 52' N 54° 53' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 female. (W)

Station 36, N.E. of the mouth of the Suriname River, 6° 55' N 54° 54' W; bottom mud; depth 55 m; 12 May 1957. — 3 males, 2 ovigerous females. (W)

Station 211, between the mouths of the Suriname and Marowijne Rivers, 6° 44' N 54° 31' W; bottom mud; depth 42 m; 14 June 1957. — 1 male. (L)

Station 214, between the mouths of the Suriname and Marowijne Rivers, 6° 47' N 54° 29' W; bottom mud and fine shells; depth 44 m; 14 June 1957. — 1 male. (W)

Station 220, N.W. of the mouth of the Marowijne River, 6° 42.5' N 54° 11' W; bottom mud; depth 42 m; 14 June 1957. — 1 female. (L)

N.N.W. of "Suriname Rivier" lightvessel, 7° 2' N 55° 40' W; depth 55 m; 8 August 1957. — 1 male, 1 ovigerous female. (L)

Off Suriname; 1957. — 4 males, 7 females (3 ovigerous). (W)

Description. Rathbun, 1925, p. 65, pl. 214.

Remarks. The carapace lengths of the above specimens vary between 12 and 19 mm, those of the ovigerous females between 16 and 19 mm.

Colour. In some specimens traces of the original colour pattern are still visible. The walking legs show reddish brown rings on the various segments: two or three on the merus, one at either end of the carpus, one at either end and one in the middle of the propodus, and one in the basal part of the dactylus. Also the merus of the chelipeds shows three dark rings.

A female from Station 32 is infested with a Sacculinid parasite, while the female from Station 220 shows a similar but extremely young parasite. The smaller female from Station 8 bears a barnacle on the carapace.

Type locality. East of the delta of the Mississippi River, 29° 14' 30" N 88° 09' 30" W; depth 68 fms.

Distribution. Off the east and south coast of the U.S.A. (from South Carolina to Alabama), and near Trinidad. The present record considerably extends our knowledge of the range of this species.

**Paradasygius tuberculatus** (Lemos de Castro, 1949) (pl. VI fig. 1)

## Coquette Investigations

About 20 miles N.N.W. of the mouth of the Coppename River; depth 31 m; 1-5 April 1957; first voyage. — 1 male, 1 female (L)

N.N.W. of the mouth of the Marowijne River, 20 miles offshore; depth 27 m; 29 April-3 May 1957; fifth voyage. — 1 female. (L)

15 miles N. of "Suriname Rivier" lightvessel; depth 18 m; 3 May 1957; fifth voyage. — 1 male, 4 females. (L)

20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; sixth voyage. — 3 males, 3 females (2 ovigerous). (L)

Station 1, off the mouth of the Suriname River, 6° 22' N 55° 06' W; bottom mud; depth 26 m; 11 May 1957. — 1 female. (W)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 2 males, 1 female. (W)

Station 6, off the mouth of the Suriname River, 6° 24.5' N 55° 03' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 3 males, 1 female. (W)

Station 75, off N.W. French Guiana, 5° 56' N 53° 17' W; bottom mud and shells; depth 29 m; 21 May 1957. — 1 male, 2 females. (L)

Station 157, off the mouth of the Suriname River, 6° 22' N 55° 03.5' W; bottom mud; depth 24 m; 4 June 1957. — 1 juvenile. (L)

Description. Lemos de Castro, 1949, p. 349, figs. 1-11 (as *Dasygius tuberculatus*).

Remarks. The specimens have the carapace lengths varying between 14 and 23 mm, the two ovigerous females have cl. 17 and 18 mm.

I am much indebted to Dr. John S. Garth, Allan Hancock Foundation, Los Angeles, for help received with the identification of this material, and to Dr. Lemos de Castro for his kindness in sending me his publication which at first was inaccessible to me.

Type locality. Praia de Mucuripe, Fortaleza, Ceará State, Brazil.

Distribution. Until now the species was only known from Brazil; the present records are the first from French Guiana and Suriname.

**Libinia ferreirae** De Brito Capello, 1871 (pl. V fig. 1)

? "Spier-witte krab" Teenstra, 1835, p. 443.

? *Maja* Kappler, 1887, p. 202.

## Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 male. (L)

20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; sixth voyage. — 2 males. (L)

Station 23, N.E. of the mouth of the Suriname River, 6° 24' N 54° 59.5' W; bottom shells; depth 27 m; 12 May 1957. — 1 female. (W)

## Museum Leiden

Near "Suriname Rivier" lightvessel; 12 and 13 January 1953; H. W. Lijding. — 3 females.

East of "Suriname Rivier" lightvessel; trawled; 30 October 1953; H. W. Lijding. — 2 males, 2 females.

Between "Suriname Rivier" lightvessel and the coast; 27 July 1953; D. C. Geijskes. — 1 female.

Suriname coast near "Suriname Rivier" lightvessel; trawled; 13 July 1953; H. W. Lijding. — 2 females.

Description. Rathbun, 1925, p. 324, pls. 118, 119, 245 figs. 4, 5.

Remarks. The present specimens have cb. varying from 22 to 63 mm and cl. from 24 to 64 mm. Some of the specimens carried one or more sea-anemones on the carapace. One or more of the branchial spines may be lacking on one or either side of the carapace.

Type locality. Probably Brazil.

Distribution. British Guiana, Suriname, Brazil. Graham's (1955, p. 34, pl. 5 fig. 1) Spider Crab from British Guiana undoubtedly belongs to the present species.

Occurrence in Suriname. Possibly the crab which Teenstra (1835, p. 443) described as "eene spier-witte met een' langen, vooruitstekenden kop en eenige horenachtige punten gewapend" (a purely white crab with a long protruding snout and armed with horn-like spines) is the present species. Also Kappler's (1887, p. 202) "Seespinne, *Maja*", which he found "manchmal bei niederem Wasser auf den Sandbänken des Maroni", may belong here. *Libinia ferreirae*, namely, seems to be the only spider crab which is found rather close to the Suriname seashore. According to Graham (1955) in some seasons it is abundant in the fishermen's nets in British Guiana.

**Libinia bellicosa** Oliveira, 1944 (textfig. 44)

## Coquette Investigations

20 miles N. of the mouth of the Marowijne River; depth 27 m; 23-27 April 1957; fourth voyage. — 1 male, 3 females. (L)

20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; sixth voyage. — 2 males. (L)

Station 23, N.E. of the mouth of the Suriname River, 6° 24' N 54° 59.5' W; bottom shells; depth 27 m; 12 May 1957. — 2 males. (W)

Description. Oliveira, 1944, p. 87, pls. 1-3.

Remarks. The systematic position of the present species was rather uncertain till quite recently. Rathbun (1925, p. 330) considered it to be identical with *Libinia rostrata* Bell, a species at that time known only from the type specimen, which was said to be collected in Peru by H. Cuming. As this type

specimen was lost and as no other material from the American west coast was available, for a comparison of her Atlantic material Rathbun had to rely on Bell's description and figure. The few discrepancies found might have been due to individual variation or to errors in Bell's figure; therefore Rathbun decided not to consider the Atlantic and Pacific forms two different species. This was the more justified as it is a well known fact that Cuming's locality labels often were inaccurate. Oliveira (1944), basing himself on Brazilian material, decided to consider the Atlantic form a separate variety of Bell's species, *Libinia rostrata bellicosa*. It was not until 1958 that new Pacific material of *Libinia rostrata* was dealt with in a publication.

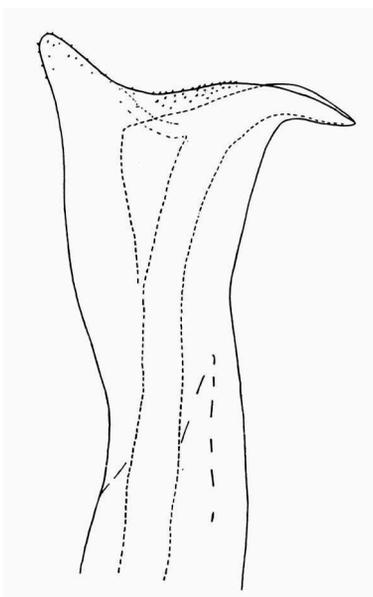


Fig. 44. *Libinia bellicosa* Oliveira. Tip of right first pleopod of male in anterior view. Specimen from fourth voyage of the "Coquette".  $\times 33$ .

Then, namely, Garth (1958, p. 328, pl. T fig. 6, pl. 37 fig. 2) gave a description and figures of this Pacific form, basing himself on four specimens from Paita, Peru. A comparison of our Suriname material with Garth's account shows that his supposition that the Atlantic and Pacific forms should be regarded as different species is correct and that Oliveira was justified in erecting a new taxon for the Atlantic form. The latter now should be known as *Libinia bellicosa* Oliveira.

In my specimens the arrangement of the spines in the median region of the carapace is very similar to that described by Garth, only the "boss on cardiac region" in the present material is a spine of about the same size as

the intestinal spine. Behind the cardiac spine there is an obscure double tubercle, which was also figured by Oliveira, but neither mentioned nor figured by Garth. The small tubercle shown in Oliveira's figure immediately behind the median anterior gastric spine is not present in any of my specimens. All the other spines and tubercles are as in Oliveira's pl. 2 fig. 4.

The upper margin of the merus of the cheliped has three or four large tubercles, one of which is subterminal; a few smaller additional tubercles may be found on this margin also. The tubercles on the rest of the surface of the merus are hardly noticeable.

The first male pleopod strongly resembles that of *Libinia rostrata* as figured by Garth (1958, pl. T fig. 6), only the inner half of the distal part is more anteriorly produced.

Type locality. Ilha do Pinheiro, Rio de Janeiro Bay, Brazil.

Distribution. The specimens from the Atlantic coast of the Panama Canal Zone and Brazil reported upon by Rathbun (1925) as *L. rostrata* undoubtedly belong in the present species. These records together with that by Oliveira from Rio de Janeiro and the present finds from off the Suriname coast, show that the species inhabits the northern coast of the S. American continent at least from Panama to Rio de Janeiro. The species had not been reported from Suriname before.

### **Mithrax caribbaeus** Rathbun, 1920

#### Coquette Investigations

20 miles N. of the coast of Suriname between the mouths of the Nickerie and Copename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 male. (L)

Station 31, N.E. of the mouth of the Suriname River, 6° 50' N 54° 53.5' W; bottom hard mud and shells; depth 49 m; 12 May 1957. — 1 male. (W)

N.N.W. of "Suriname Rivier" lightvessel, 7° 2' N 55° 40' W; depth 55 m; 8 August 1957. — 1 female. (L)

Description. Rathbun, 1925, p. 409, pls. 148, 149.

Remarks. The carapace lengths of the specimens vary between 31 and 46 mm, the carapace breadths between 35 and 53 mm.

Type locality. St. Thomas, West Indies; from piles in harbour.

Distribution. West Indies, Venezuela. The species is now reported for the first time from Suriname.

### **Stenonionops furcata** (Olivier, 1791)

*Pericera cornuta* Thallwitz, 1892, p. 54.

Description. Rathbun, 1925, p. 449, pls. 160, 161

Type locality. Unknown.

Distribution. East coast of America from Georgia (U.S.A.) to Brazil and the West Indies.

Occurrence in Suriname. Thallwitz (1892), who used the name *Pericera cornuta* for the present species, reported upon material in the collection of the Dresden Museum, which was said to originate from "Surinam. Westindien." I have not seen any Suriname material of the species myself.

#### Family Parthenopidae

### **Lambrus serratus** H. Milne Edwards, 1834

#### Coquette Investigations

20 miles N. of the coast of Suriname between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 male. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 1 ovigerous female. (L)

Station 3, off the mouth of the Suriname River, 6° 24' N 55° 05' W; bottom shells; depth 27 m; 11 May 1957. — 1 male. (L)

Station 4, off the mouth of the Suriname River, 6° 25' N 55° 05' W; depth 29 m; 11 May 1957. — 1 male. (L)

Station 29, N.E. of the mouth of the Suriname River, 6° 49' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 1 male. (W)

Station 30, N.E. of the mouth of the Suriname River, 6° 49.5' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 1 male, 2 females. (W)

Station 32, N.E. of the mouth of the Suriname River, 6° 51' N 54° 53.5' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 female. (W)

Station 36, N.E. of the mouth of the Suriname River, 6° 55' N 54° 54' W; bottom mud; depth 55 m; 12 May 1957. — 1 male. (W)

Station 275, between the mouths of the Coppename and Suriname Rivers, 6° 41' N 55° 29' W; bottom shells and coral; depth 42 m; 25 June 1957. — 1 male. (W)

Station 276, between the mouths of the Coppename and Suriname Rivers, 6° 41.5' N 55° 31' W; bottom shells and coral; depth 42 m; 25 June 1957. — 1 ovigerous female. (W)

Station 283, between the mouths of the Coppename and Suriname Rivers, 6° 47' N 55° 40' W; bottom mud and fine shells; depth 46 m; 26 June 1957. — 1 ovigerous female. (L)

N.N.W. of "Suriname Rivier" lightvessel, 7° 2' N 55° 40' W; depth 55 m; 8 August 1957. — 1 male. (L)

Description. Rathbun, 1925, p. 516, pls. 180, 181, 275 figs. 7-10.

Remarks. In the present specimens the cl. varies between 15 and 20 mm, cb. between 19 and 29 mm; in the ovigerous females cl. is 18 to 20 mm, cb. 24 to 29 mm.

Type locality. "Océan indien", an erroneous locality indication.

Distribution. East coast of America from Bermuda and North Carolina (U.S.A.) to Brazil and the West Indies. Now reported for the first time from Suriname.

**Lambrus fraterculus** Stimpson, 1871

## Coquette Investigations

Station 287, N.E. of the mouth of the Coppename River, 6° 52' N 55° 50' W; bottom mud, shells and coral; depth 48 m; 26 June 1957. — 1 female. (W)

N.N.W. of "Suriname Rivier" light vessel, 7° 2' N 55° 40' W; depth 55 m; 8 August 1957. — 1 male. (L)

Description. Rathbun, 1925, p. 525, pls. 186, 187, 190 fig. 2.

Remarks. The male has cl. 12 and cb. 14 mm, the female cl. 9, cb. 10 mm.

Type localities. Off Sand Key, off Carysfort Reef, West of Tortugas, and off Conch Reef, Florida (U.S.A.); depth 26 to 68 fathoms.

Distribution. North Carolina, Florida (U.S.A.), Yucatan (Mexico), Barbados. Now reported for the first time from Suriname.

**Leiolambrus nitidus** Rathbun, 1901

## Coquette Investigations

N.N.W. of the mouth of the Marowijne River, 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 male. (L)

N.N.W. of the mouth of the Marowijne River, about 30 miles offshore; depth 37 m; 29 April-3 May 1957; fifth voyage. — 1 male. (L)

20 miles N. of the mouth of the Suriname River; depth 9 m; 6-9 May 1957; sixth voyage. — 1 male, 3 females. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 2 females. (W)

Station 15, N.E. of the mouth of the Suriname River, 6° 24.5' N 54° 59.5' W; bottom mud and shells; depth 29 m; 11 May 1957. — 1 male, 1 ovigerous female. (W)

Station 32, N.E. of the mouth of the Suriname River, 6° 51' N 54° 53.5' W; bottom mud and shells; depth 51 m; 12 May 1957. — 7 males. (W)

Station 33, N.E. of the mouth of the Suriname River, 6° 52' N 54° 53' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 male. (W)

Station 36, N.E. of the mouth of the Suriname River, 6° 55' N 54° 54' W; bottom mud; depth 55 m; 12 May 1957. — 1 female. (W)

Station 86, off N.W. French Guiana, 5° 49.5' N 53° 09' W; bottom rocky with mud, coral and shells; depth 27 m; 22 May 1957. — 1 female. (L)

Station 220, N.W. of the mouth of the Marowijne River, 6° 42.5' N 54° 11' W; bottom mud; depth 42 m; 14 June 1957. — 1 male, 1 female. (L)

Off Suriname; 1957. — 1 male, 1 ovigerous female. (W)

Description. Rathbun, 1925, p. 545, pls. 199, 281 fig. 1.

Remarks. The examined specimens have cl. ranging from 9 to 13 mm, and cb. from 13 to 20 mm; in ovigerous females cl. is 11 to 13 mm, cb. 18 to 20 mm.

The specimens closely agree with Rathbun's description, though some slight discrepancies were noted. These may be caused by the fact that Rathbun's holotype is rather small (cb. 10.3 mm). The "small tubercle, sometimes pointed, on postero-lateral margin at end of branchial ridge" is a distinct tooth in

my specimens, while the extremities of the posterior margin of the carapace, like in the type, are angular or marked with a small tooth. In my material the walking legs do not reach beyond the end of the arm of the cheliped.

Type locality. Mayaguez Harbor, Puerto Rico; depth 12 to 18 fathoms.

Distribution. Jamaica, Puerto Rico. Now reported for the first time from Suriname.

***Heterocrypta caledoniana*** Garth, new species (pl. VI fig. 2)

Coquette Investigations

20 miles N. of the coast of Suriname between the mouths of the Nickerie and Copename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 ovigerous female.

15 miles N. of the mouth of the Suriname River; depth 18 m; 3 May 1957; fifth voyage. — 1 female.

Description. The present new species was first discovered by Dr. John S. Garth, Allan Hancock Foundation, Los Angeles, when studying the Hancock collections of Atlantic Oxyrhynch crabs. As it will take some time before a paper on these collections can be published, Dr. Garth kindly consented in having a diagnosis of his new species inserted in the present paper. The following is a verbatim citation of Dr. Garth's preliminary account of the new species.

*"Heterocrypta caledoniana, n. sp.*

Type: Male holotype, A.H.F. No. 399, and one male paratype, Caledonia Bay, Panama, April 4, 1939, 1 fathom, hard sand, Velero III station A7-39; one male paratype, same locality, April 26, 1939, 7-12 fathoms, mud, Velero III station A53-39; 3 males and 6 females, paratypes, presumably from the same locality but without station identification; specimens collected by the Allan Hancock Atlantic Expedition of 1939.

Measurements: Male holotype, length 8.5 mm, width 9.9 mm, front 0.3 mm, width 1.6 mm, fronto-orbit 3.0 mm, cheliped 19.0 mm, chela 9.3 mm, dactyl 3.3 mm, height of palm 2.9 mm.

Diagnosis: Carapace depressed, one and one-sixth times wide as long, anterolateral margins dentate, a prominent notch at anterior third. Posterolateral margins between branchial ridge and lateral angle straight. Branchial ridges continuing onto gastric region; gastric, cardiac, and branchial regions not especially elevated. Front arcuate, not projecting beyond eyes. Granular ridge traversing subhepatic and pterygostomian regions interrupted at middle.

Remarks: The proposed new species is not closely allied to any member of the genus. In one respect it approaches *Solenolambrus*, having the posterolateral margins concave and the carapace but slightly produced over the am-

bulatory legs. The more depressed carapace, the shape of the external maxillipeds, which gape slightly, and the elongated fingers, rather than short fingers bent at right angles to the palm, argue for its inclusion in *Heterocrypta*. The pronounced interruption of the ridge connecting the external corner of the buccal frame with the base of the cheliped is a character not found in either genus, although a minute notch is detectable in *H. lapidea* Rathbun."

Remarks. A photograph of the ovigerous female (cb. 13 mm) collected during the second voyage of the "Coquette" is reproduced here (pl. VI figure 2). In this specimen part of the front is broken so that the antennulae, which otherwise are covered by the front, are visible. The second "Coquette" specimen (cb. 14 mm) carries a small oyster on the carapace, so that the entire front and the larger part of the right antero-lateral region are covered.

Distribution. The species is now known from the Atlantic coasts of Panama and Suriname.

#### Section Brachyrhyncha

#### Family Portunidae

#### **Portunus gibbesii** (Stimpson, 1859)

#### Coquette Investigations

20 miles N. of the coast of Suriname between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 male, 2 females (1 ovigerous). (L)

15 miles N. of "Suriname Rivier" lightvessel; depth 18 m; 3 May 1957; fifth voyage. — 2 specimens. (L)

20 miles N. of the mouth of the Suriname River; depth 27 m; 6-9 May 1957; sixth voyage. — 2 specimens. (L)

Station 1, off the mouth of the Suriname River, 6° 22' N 55° 06' W; bottom mud; depth 26 m; 11 May 1957. — 5 males. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 1 male. (L)

Station 7, off the mouth of the Suriname River, 6° 24.5' N 55° 02.5' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 ovigerous female. (L)

Station 11, off the mouth of the Suriname River, 6° 24' N 55° 01' W; bottom mud; depth 27 m; 11 May 1957. — 3 males, 7 females (4 ovigerous). (L)

Station 157, off the mouth of the Suriname River, 6° 22' N 55° 03.5' W; bottom mud; depth 24 m; 4 June 1957. — 1 juvenile. (L)

Station 182, N.E. of the mouth of the Coppename River, 6° 15' N 55° 54' W; bottom mud; depth 24 m; 6 June 1957. — 1 female. (W)

Station 260, between the mouths of the Coppename and Suriname Rivers, 6° 40'—6° 41.5' N 55° 26'—55° 41' W; bottom mud, shells and coral; depth 42 m; 20 June 1957. — 3 males, 6 ovigerous females. (W)

Description. Rathbun, 1930, p. 49, pls. 16, 17.

Remarks. The present specimens, which closely agree with Rathbun's de-

scription and figures, have cb. 14 to 77 mm; in the ovigerous females cb. is 52 to 64 mm.

Type locality. S. Carolina, and St. Augustine, Florida.

Distribution. Atlantic coast of U.S.A. (S. Massachusetts to Texas), Venezuela. Now reported for the first time from Suriname.

**Portunus rufiremus** new species (textfigs. 45, 46)

Coquette Investigations

About 20 miles N.N.W. of the mouth of the Coppename River; depth 31 m; 1-5 April 1957; first voyage. — 1 female. (L)

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 male, 1 female. (L)

20 miles N. of the coast of Suriname between the mouths of the Nickerie and Coppename Rivers; depth 27 m; 15-20 April 1957; third voyage. — 1 male (L)

N.N.W. of the mouth of the Marowijne River, 20 miles offshore; depth 27 m; 29 April-3 May 1957; fifth voyage. — 2 females. (L)

Near "Suriname Rivier" lightvessel; depth 7 m; 3 May 1957; fifth voyage. — 1 male. (L)

15 miles N. of "Suriname Rivier" lightvessel; depth 18 m; 3 May 1957; fifth voyage. — 3 males. (L)

20 miles N. of the mouth of the Suriname River; depth 27 m; 6-9 May 1957; sixth voyage. — 9 males, 2 females. (L)

Station 157, off the mouth of the Suriname River, 6° 22' N 55° 03.5' W; bottom mud; depth 24 m; 4 June 1957. — 14 males, 8 females. (W)

Station 188, N.E. of the mouth of the Suriname River, 6° 24' N 54° 55' W; bottom mud; depth 27 m; 10 June 1957. — 1 male. (W)

Station 209, between the mouths of the Suriname and Marowijne Rivers, 6° 41' N 54° 33' W; bottom mud and shells; depth 40 m; 14 June 1957. — 2 females. (W)

Station 211, between the mouths of the Suriname and Marowijne Rivers, 6° 44' N 54° 31' W; bottom mud; depth 42 m; 14 June 1957. — 1 male (holotype). (L)

Description. The surface of the carapace is densely granular and pubescent. The granules are rather evenly distributed; only in the gastric area they form distinct transverse rows. These rows are two in number: one on the line between the meso- and meta-gastric regions, and one somewhat more anteriorly; the anterior row is interrupted in the middle. A very inconspicuous row of granules may be seen extending from the last antero-lateral tooth of the carapace, curving forwards over the branchial region. Like in *P. gibbesii* the carapace shows a naked spot near the postero-lateral margin above the base of the fourth pereopod; no naked iridescent spots were to be seen near the bases of the antero-lateral teeth. The front has the submedian teeth bluntly triangular or rounded; they are narrow and are separated from one another by a rather deep U-shaped sinus. The outer teeth are very broad and have the top bluntly rounded, they are separated from the submedian teeth by a very wide sinus, and from the inner orbital teeth by a much nar-

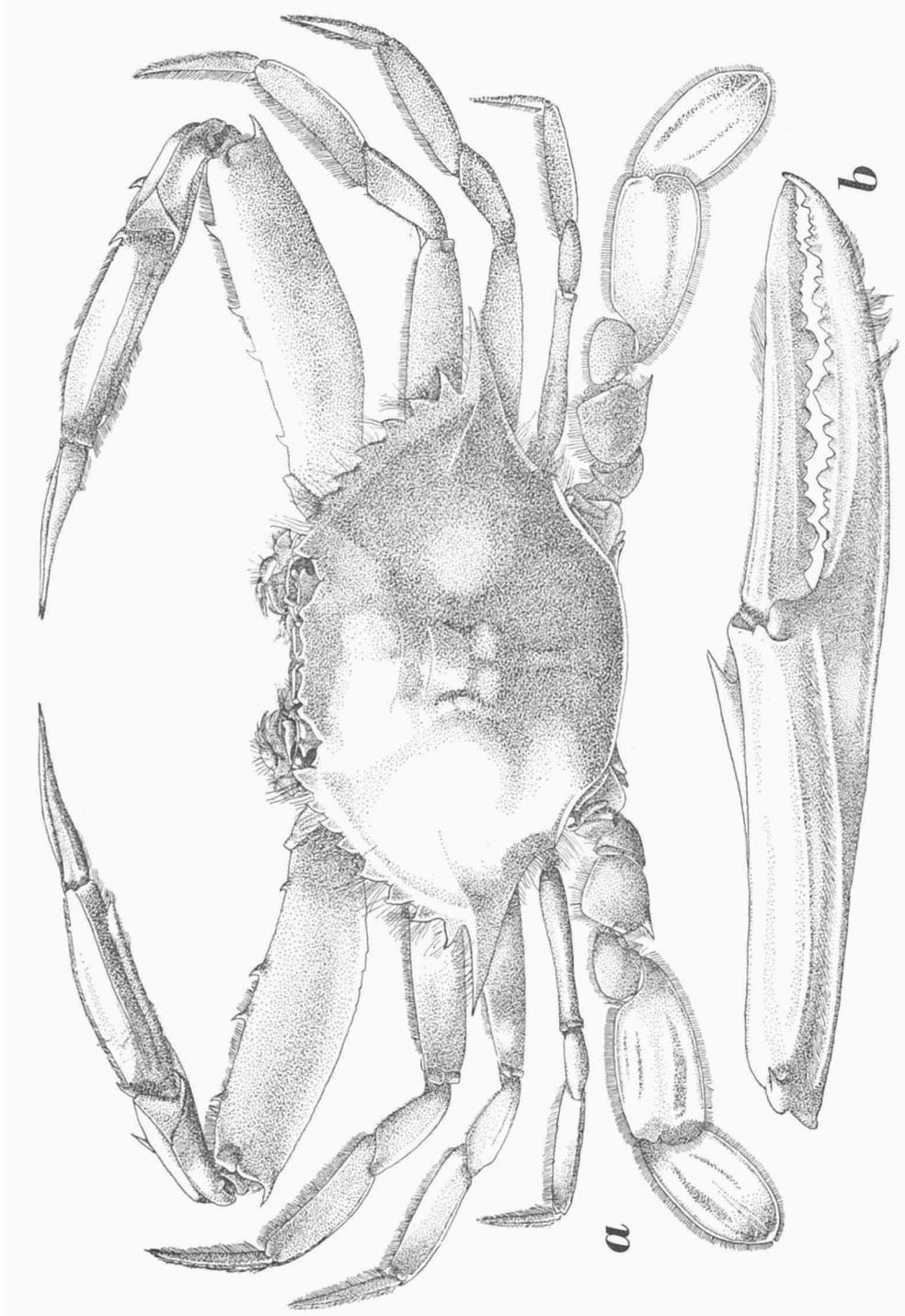


Fig. 45. *Portunus rufiremus* new species, holotype. a, animal in dorsal view; b, chela.  
a, X 2; b, X 4. W. C. G. Gertenaar del.

rower sinus. The four frontal teeth reach about equally far forwards, slightly overreaching the inner orbital teeth. The latter are rounded and on their inner side bear a lobe. The upper margin of the orbit shows two fissures which are V-shaped at their distal end. The inner lower tooth of the orbit is large and well-advanced. The antero-lateral borders of the carapace together form a wide arch, the center of which is near the posterior margin of the carapace. The antero-lateral teeth, nine in number, are separated by small but distinct interspaces. The first tooth (= outer orbital tooth) is blunt, the following teeth all end in a slender spine. The anterior of these are directed forwards. The last antero-lateral tooth is very strong, being distinctly more than twice as long as the preceding; it is directed straight outwards. The postero-lateral angle of the carapace is rounded.

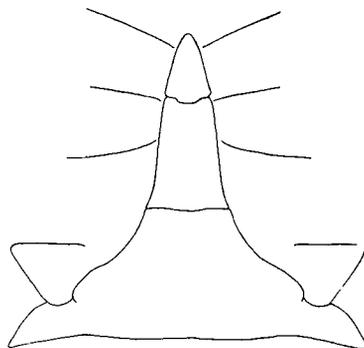


Fig. 46. *Portunus rufiremus* new species, holotype. Male abdomen.  $\times 2.5$ .  
W. C. G. Gertenaar del.

The chelipeds are very long, pubescent, and have granular carinae. The merus bears four to six strong spines on its inner margin and one at the distal end of its outer margin. The upper surface of the merus bears granules (which in the inner part form a reticular pattern) and short hairs. A fringe of long hairs extends along the inner margin of the merus below the just mentioned spines. The lower surface of the merus is smooth; it is pubescent in the outer half, almost naked in the inner. The carpus bears a strong spine in the inner and one in the outer part of the anterior margin. The upper surface bears four longitudinal carinae, the second inner of which gives off a branch to the inner spine. The palm shows seven longitudinal carinae: (1) one on the lower margin; this carina is distinct and granular on the fingers and in the distal half of the palm, but becomes inconspicuous in the proximal palmar portion, it bears a fringe of long hairs along the outer side of its distal half, (2) one on the outer surface of the palm just above the

ventral carina; it is distinct throughout its course, being especially pronounced in its basal part where it takes over the rôle of the ventral carina; along the upper side it is bordered with a fringe of long hairs, (3) one extending from the spine in the basal part of the outer surface of the palm to the base of the dactylus; it is distinct but less so than the previous one, and bears no fringe of hairs, (4) one extending midway between the previous carina and the upper margin of the palm; it is distinct but less elevated than no. 3, (5) one along the upper margin of the palm; it ends in a strong spine at a short distance behind the base of the dactylus; a fringe of hairs extends along its inner side, being most distinct distally, (6 and 7) two blunt carinae over the middle of the inner surface of the palm; they are distinct in their proximal half only. The outer surface of the dactylus shows four carinae, that of the fixed finger two; a fringe of long hairs is present on the upper margin of the dactylus and on the lower margin of the fixed finger, both forming the continuation of the fringes found on the palm. The merus of the swimming legs is about as long as broad. Its posterior margin bears a distinct spine, distally of which the margin is finely serrated.

The second and third segments of the male abdomen are provided with a sharp transverse carina and end laterally in sharply pointed upturned angles. The fused segment formed by the fourth and fifth strongly narrows anteriorly and the sixth segment is very narrowly quadrangular. On account of this the abdomen is somewhat intermediate in shape between that of a typical *Portunus* and the one found in *Callinectes*. The first pleopods of the male reach slightly beyond the middle of the sixth segment; their distal part is straight and directed slightly outwards, the tips diverging.

Colour. My preserved specimens have the carapace pale reddish brown. The legs are still paler reddish brown above. The lower surface of the specimens is yellowish white. The spines on the inner margin of the merus of the chelipeds are dark red, as are also the inner spine of the carpus and the tips of the fingers. The distal joints of the second to fourth pereopods are pinkish, while the distal half of the dactylus of the swimming legs has a dark red spot.

Remarks. The present new species is closest to *Portunus gibbesii* (Stimpson), with specimens of which it could be directly compared, and to *P. panamensis* (Stimpson). From the first species it differs in (1) the shape of the front, (2) the pattern of the granules on the carapace, (3) the absence of naked spots at the bases of the antero-lateral teeth of the carapace, (4) the presence of hairy fringes on the chela, (5) the remarkable development of the one but lowest carina on the external surface of the chela, (6) the presence of a strong spine on the merus of the fifth pereopod, (7) the shape of the

male abdomen and the male pleopods, which are S-shaped in *P. gibbesii* with the tips converging. *P. panamensis* differs from the present new species in (1) the shape of the front which has the outer teeth triangular, narrower, more pointed, and less conspicuously different from the submedian teeth, (2) the far more numerous and more distinct rows of granules on the carapace, (3) the absence of hairy fringes on the chelipeds, (4) the lower two carinae of the outer surface of the palm of the chelipeds which are of about the same strength, (5) the shape of the male abdomen which is more triangular.

Holotype is the male from "Coquette" Sta. 211. It is preserved in the Leiden Museum under Reg. No. Crustacea D. 12379.

### **Portunus spinimanus** Latreille, 1819

#### Coquette Investigations

20 miles N. of the mouth of the Suriname River; depth 27 m; 6-9 May 1957; sixth voyage. — 1 ovigerous female. (L)

Station 297, N.W. of the mouth of the Suriname River, 6° 45'—6° 50.5' N 55° 17'—55° 27' W; bottom mud and fine shells; depth 44 m; 28 June 1957. — 1 male. (W)

Description. Rathbun, 1930, p. 62, textfig. 10, pls. 26-28.

Remarks. The ovigerous female has cb. 57 mm, the male cb. 88 mm.

Type locality. Brazil.

Distribution. From Bermuda and New Jersey (U.S.A.) to S. Brazil and the West Indies. The species has not been reported from Suriname before.

### **Portunus spinicarpus** (Stimpson, 1871)

#### Coquette Investigations

Station 3, off the mouth of the Suriname River, 6° 24' N 55° 05' W; bottom shells; depth 27 m; 11 May 1957. — 1 male. (L)

Station 4, off the mouth of the Suriname River, 6° 25' N 55° 05' W; depth 29 m; 11 May 1957. — 1 male. (L)

Station 6, off the mouth of the Suriname River, 6° 24.5' N 55° 03' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 male. (L)

Station 8, off the mouth of the Suriname River, 6° 24' N 55° 02.5' W; bottom grey mud and shells; depth 27 m; 11 May 1957. — 1 male, 1 female. (L)

Station 28, N.E. of the mouth of the Suriname River, 6° 48' N 54° 54' W; bottom shells; depth 46 m; 12 May 1957. — 2 males, 1 female. (W)

Station 29, N.E. of the mouth of the Suriname River, 6° 49' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 5 males, 2 females. (W)

Station 30, N.E. of the mouth of the Suriname River, 6° 49.5' N 54° 54' W; bottom hard mud and shells; depth 48 m; 12 May 1957. — 2 males, 2 females. (W)

Station 31, N.E. of the mouth of the Suriname River, 6° 50' N 54° 53.5' W; bottom hard mud and shells; depth 49 m; 12 May 1957. — 2 males, 5 females (1 ovigerous). (W)

Station 32, N.E. of the mouth of the Suriname River, 6° 51' N 54° 53.5' W; bottom mud and shells; depth 51 m; 12 May 1957. — 4 males, 1 ovigerous female. (W)

Station 33, N.E. of the mouth of the Suriname River,  $6^{\circ} 52' N$   $54^{\circ} 53' W$ ; bottom mud and shells; depth 51 m; 12 May 1957. — 1 ovigerous female. (W)

Station 36, N.E. of the mouth of the Suriname River,  $6^{\circ} 55' N$   $54^{\circ} 54' W$ ; bottom mud; depth 55 m; 12 May 1957. — 7 males, 5 females. (W)

Station 214, between the mouths of the Suriname and Marowijne Rivers,  $6^{\circ} 47' N$   $54^{\circ} 29' W$ ; bottom mud and fine shells; depth 44 m; 14 June 1957. — 1 male. (W)

Station 220, N.W. of the mouth of the Marowijne River,  $6^{\circ} 42.5' N$   $54^{\circ} 11' W$ ; bottom mud; depth 42 m; 14 June 1957. — 1 male. (L)

Station 298, off the mouth of the Suriname River,  $6^{\circ} 45' N$   $55^{\circ} 17' W$ ; bottom mud and fine shells; depth 44 m; 28 June 1957. — 1 male. (L)

N.N.W. of "Suriname Rivier" lightvessel,  $7^{\circ} 2' N$   $55^{\circ} 40' W$ ; depth 55 m; 8 August 1957. — 3 males. (L)

Description. Rathbun, 1930, p. 92, pl. 45.

Remarks. In the present specimens *cb.* varies between 26 and 54 mm, in the ovigerous females between 40 and 41 mm. One of the males collected on 8 August is infested with a Sacculinid parasite. The male from Station 3 is aberrant in that the left lateral tooth of the carapace is strongly reduced.

Type localities. Off the Tortugas, off Carysfort Reef, off Conch Reef, off Alligator Reef, off Pacific Reef,  $31^{\circ} 31' N$   $79^{\circ} 41' W$ , and off American Shoal, all localities near Florida, U.S.A.; depth 13 to 150 fathoms.

Distribution. East coast of America from N. Carolina (U.S.A.) to Brazil and the West Indies. The species is now reported for the first time from Suriname.

### **Callinectes ornatus** Ordway, 1863

#### Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 20 miles offshore; depth 35 m; 8-12 April 1957; second voyage. — 1 male. (L)

Near "Suriname Rivier" lightvessel; depth 7 m; 3 May 1957; fifth voyage. — 1 juvenile. (L)

20 miles N. of the mouth of the Suriname River; depth 27 m; 6-9 May 1957; sixth voyage. — 19 specimens.

Station 1, off the mouth of the Suriname River,  $6^{\circ} 22' N$   $55^{\circ} 06' W$ ; bottom mud; depth 26 m; 11 May 1957. — 1 male. (W)

Station 2, off the mouth of the Suriname River,  $6^{\circ} 23' N$   $55^{\circ} 05.5' W$ ; bottom mud; depth 27 m; 11 May 1957. — 2 juveniles. (W)

Station 20, N.E. of the mouth of the Suriname River,  $6^{\circ} 28' N$   $54^{\circ} 57.5' W$ ; bottom shells; depth 31 m; 11 May 1957. — 1 juvenile. (W)

Station 66, off N.W. French Guiana,  $6^{\circ} 00' N$   $53^{\circ} 29' W$ ; bottom hard mud; depth 27 m; 21 May 1957. — 2 males, 1 female, 4 juveniles. (L)

Station 75, off N.W. French Guiana,  $5^{\circ} 56' N$   $53^{\circ} 17' W$ ; bottom mud and shells; depth 29 m; 21 May 1957. — 1 juvenile.

Station 157, off the mouth of the Suriname River,  $6^{\circ} 22' N$   $55^{\circ} 03.5' W$ ; bottom mud; depth 24 m; 4 June 1957. — 41 juveniles. (W)

Station 182, N.E. of the mouth of the Coppename River,  $6^{\circ} 15' N$   $55^{\circ} 54' W$ ; bottom mud; depth 24 m; 6 June 1957. — 1 male. (W)

## Museum Leiden

Mouth of the Suriname River near Resolutie; in shrimp trap; 22 December 1942; D. C. Geijskes. — 1 juvenile.

Description. Rathbun, 1930, p. 114, textfigs. 15b, 16a, 17a, 18b, pl. 50.

Remarks. The specimens have cb. ranging from 26 to 78 mm, and cl. from 13 to 36 mm. The identity of the juveniles with cb. less than 40 mm is not fully certain.

Type localities. Charleston Harbor (S. Carolina, U.S.A.), Tortugas (Florida, U.S.A.), Bahama Islands, Gonaives (Haiti), Cumana (Venezuela).

Distribution. East coast of America from New Jersey (U.S.A.) and Bermuda to Brazil and the West Indian Islands. The species is now reported for the first time from Suriname.

**Callinectes danae** Smith, 1869

## Museum Leiden

Near "Suriname Rivier" lightvessel; trawled; depth 7 m; 12-13 January 1953; H. W. Lijding. — 1 ovigerous female.

Description. Rathbun, 1930, p. 118, textfigs. 15d, 16b, 17b, 18d, pl. 51.

Remarks. The above ovigerous female has cl. 42 and cb. 91 mm.

Type localities. Pernambuco, Bahia, and Rio de Janeiro, Brazil; restricted to Pernambuco by Rathbun (1930, p. 118).

Distribution. East coast of America from Florida (U.S.A.) to S. Brazil and the West Indies. The species has not been reported before from Suriname.

**Callinectes bocourti** A. Milne Edwards, 1879 (textfig. 47; pl. V fig. 2)

"Crabe au pied large" Fermin, 1765, p. 72.

*Cancer parvus* Fermin, 1769, vol. 2, p. 277; Fermin, 1770, vol. 2, p. 249.

"Krab met breede Pooten" Hartsinck, 1770, p. 118.

*Cancer pelagicus* De Geer, 1778, p. 427, pl. 26 figs. 8-11.

"Seereeca" Stedman, 1796, vol. 1, p. 391; Stedman, 1813, p. 406.

"Syryca" Stedman, 1798, vol. 2, p. 103; Stedman, 1799, vol. 2, p. 172.

"Sirika-krab" Teenstra, 1835, vol. 2, p. 443.

*Lupa diacantha* Kappler, 1881, p. 143; Kappler, 1887, p. 202.

"Krab" Jentink, 1888, p. 8.

*Callinectes danae* Tesch, 1914, p. 195.

## Coquette Investigations

20 miles N. of the mouth of the Suriname River; depth 27 m; 6-9 May 1957; sixth voyage. — 1 female. (L)

## Museum Leiden

Shore east of the mouth of the Nickerie River; 3 July 1949; D. C. Geijskes, no. 9761. — 1 male.

Cocos Polder, Coronie; in ditches near the projected pumping installation; muddy bottom; 11 April 1957; L. B. Holthuis no. 1240. — 6 males.

Dike on the north side of the Cocos Polder, Coronie; 11 April 1957; L. B. Holthuis no. 1239. — 14 dry carapaces.

Groningen on the Saramacca River; 13 September 1911; W. C. van Heurn. — 1 male.

Mouth of the Suriname River near Braamspunt; in mud of the muddy shore; 5 April 1957; L. B. Holthuis no. 1219. — 4 males, 2 females.

Shore of the Suriname River near "Purmerend" plantation near Leonsberg, N. of Paramaribo; 1 April 1957; L. B. Holthuis no. 1208. — 1 female.

Suriname River, 10 miles above its mouth; 11 February 1954; H. W. Lijding. — 16 specimens.

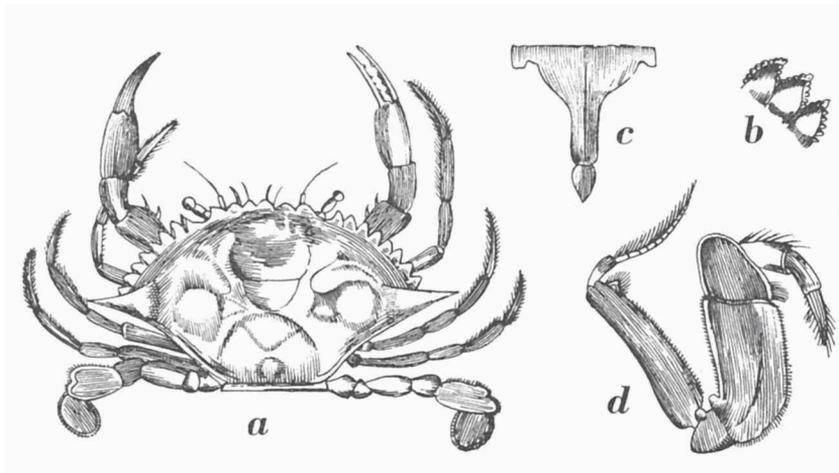


Fig. 47. *Callinectes bocourti* A. Milne Edwards. a, animal in dorsal view; b, detail of antero-lateral margin of carapace; c, abdomen of male; d, third maxilliped. After De Geer, 1778.

"Morgenstond" plantation near Paramaribo; 1911; W. C. van Heurn. — 1 female.

Shore of Suriname River near "Morgenstond" plantation; 15 December 1939; D. C. Geijskes. — 1 male.

In swamp near the Agricultural Experiment Gardens, Paramaribo; 10 June 1911, W. C. van Heurn; 10 March 1939, H. W. C. Cossee; 10 October 1939, D. C. Geijskes. — 3 males, 2 females.

In ditch of the Agricultural Experiment Gardens, Paramaribo; 29 September 1939; D. C. Geijskes. — 1 male.

Paramaribo; 1911, July 1911, W. C. van Heurn; 23 March 1939, H. W. C. Cossee. — 2 males, 2 females.

Plantation near Paramaribo; 1880; J. H. Spitzly. — 1 male.

Suriname River near "La Resource" plantation near Domburg; 19 December 1939; D. C. Geijskes. — 1 female.

Matappica Canal; brackish water; in fish trap; 8 May 1948; D. C. Geijskes. — 2 females.

Small ditch near "Matappica" Fisheries Service Station, near the Matappica Canal; bottom muddy; 6 April 1957; L. B. Holthuis no. 1221. — 2 males, 1 females.

Swamp at 1.2 km S. of the sea shore near the Wiawia Bank; 16 November 1948; 1948-1949 Suriname Expedition no. 2824. — 1 male.

Mouth of the Marowijne River near Galibi; near the river bank; 4 November 1948; 1948-1949 Suriname Expedition no. 2412. — 1 male.

Small creek in plantation near Galibi; 9 November 1948; 1948-1949 Suriname Expedition no. 2516. — 2 males, 1 female.

Mouth of the Marowijne River near Langamankondre; shallow water; 19 September 1948; 1948-1949 Suriname Expedition no. 283. — 3 males.

Suriname; 1910; D. G. J. Bolten. — 1 female.

#### Museum Amsterdam

Caledonia, lower Saramacca River; August-September 1929. — 1 malformed chela (dry).

Paramaribo; don. Koloniaal Museum, Haarlem. — 3 males, 1 female.

Paramaribo. — 1 male.

Suriname; 1922; 1922 Expedition to Hendrik Mt. — 2 females.

Suriname; don. Koloniaal Instituut, Amsterdam. — 2 males, 2 females.

#### Museum Hamburg

Paramaribo; J. Michaelis, received 31 January 1899; 29 February 1908, C. Heller. — 6 males, 2 females.

Suriname. — 1 male.

#### Museum Londen

Suriname River near Paramaribo; large muddy river with a current of several knots; 20 January 1938; I. T. Sanderson, no. 69 Cr. — 1 male.

Description. Rathbun, 1930, p. 128, textfigs. 15g, 16e, 17h, 18f, pl. 55.

Vernacular names. In the Suriname language the species is indicated with the name "srika" or "sirika", also written as "seereeca" or "syryca". Kappler (1881, p. 143) remarked that the name given to this species by the Arowac Indians is "haralubata". According to Graham (1955, p. 32) the species is named "cheriga" or "sheriger" in British Guiana.

Remarks. The specimens examined have cb. ranging between 14 and 155 mm. They agree with Rathbun's description.

In the malformed chela from Caledonia (Museum Amsterdam) the dactylus slightly distally of its base is divided into three branches of equal size, each of which has a more or less normal dactylus shape and is about as long as a normal dactylus would be. The greatest length of the propodus of this chela is 45 mm.

Colour. A remarkable feature in the colour pattern of the species is that the palm of the chela is dark reddish brown above and whitish below, the two colours being sharply separated on the outer surface of the palm. The fingers

of the chela are reddish brown. The carapace is dark olivaceous. In a field note accompanying the specimen in the collection of the British Museum, I. T. Sanderson remarked that the colour of the living specimen was "deep reddish purple, dirty white below". Coloured figures of the species were provided by Young (1900, pls. 2, 3) who dealt with it under the name *Callinectes diacanthus* (Latreille).

Type locality. Mullins River, 20 miles S. of Belize, British Honduras.

Distribution. West Indies and British Honduras to Brazil.

Occurrence in Suriname. The species is extremely common in the estuaries of the larger rivers, and seems to prefer brackish water. It has been found in the Suriname River as far as near Domburg, and is also found in swamps, ditches and pools with brackish water. The specimen collected by the "Coquette" indicates that it may also be found in the sea.

*Callinectes bocourti* occurs so plentifully in the Suriname coastal area that it is fished for food. It is sold alive on the Paramaribo fishmarket.

The species seems to be able to tolerate much lower salinities than the other Portunidae occurring in this region, which may be the reason that it is the only swimming crab found in the Suriname coastal area; all the other species of this family enumerated here have been caught only out in the sea (the single exception possibly being a juvenile *Callinectes ornatus* taken in a fish trap at Braampunt in the mouth of the Suriname River). In all of the catches of swimming crabs seen by me, either on the fishmarket or elsewhere in Suriname, no other species but *C. bocourti* was found. For this reason all the records in the literature concerning Suriname swimming crabs may confidently be assigned to the present species.

The first author to mention this species from Suriname was Fermin (1765) who described it as "Le Crabe au pied large, qui differe des autres par les jambes de derriere qui sont larges à l'extrêmité, en Latin *Latipes*." The species named *Cancer parvus* by Fermin (1769, 1770) in his later books, is evidently also this species as he assigned the native name "Cirique" to it; his description was, however, copied from Labat's (1724, vol. 1 pt. 2, p. 53) Cirique, which is either a *Pseudothelphusa* or a *Callinectes* from Martinique. Hartsinck (1770) gave only a Dutch translation of Fermin's (1765) description: "de Krab met breede Pooten, verschillende van de andere met de Achterpooten die van onderen breed zyn". De Geer (1778) described and figured a species of swimming crab under the name *Cancer pelagicus*. De Geer's account shows that this specimen is a male *Callinectes*, and it even is very probable that it belongs to *C. bocourti*, having a more than superficial resemblance to my Suriname material of that species. As to the origin of his material De Geer does not provide any indication other than stating that the crabs

of this species "se trouvent dans l'océan des deux Indes". Inasmuch as De Geer received Suriname material of Crustacea from Rolander, and as *Callinectes bocourti* is a very common species in Suriname, the possibility that De Geer's specimen of "*Cancer pelagicus*" came from Suriname is rather great. The name *Cancer pelagicus* Linnaeus was incorrectly applied by De Geer to the present species; Linnaeus's species belongs in the genus *Portunus* and is an Indo-West Pacific form. Stedman (1796) mentioned that "crabs, called *seereeca*" are eaten by the Indians; the native name used by him indicates that the present species was evidently meant. Teenstra (1835) gave the following account: "De *sirika-kraab* is, gelijk de Nederlandsche, bruinachtig, en, ofschoon kleiner, dan de blaauwe, de beste van smaak". (The sirika crab is of a brownish colour, like the Dutch crab (= *Cancer pagurus* L.), and, though it is smaller than the blue crab (= *Ucides*), it has a better taste). Kappler (1881) gave a more extensive account of the species: "Eine andere viel seltener Art, in der Kolonie unter dem Namen Sirca, bei den Arowaken als haralubata bekannt (lupa diacantha) hält sich nur in See- und Brackwasser auf, lebt von thierischen Substanzen und wird in den Gräben von Paramaribo und in Salzwassersümpfen gefangen. Ihre Schale ist viel platter als die des gewöhnlichen Krabben, an der Seite gezähnt und stachelich, ebenso wie die beiden gleich grossen Scheeren. Sie sind gelblich von Farbe, durch das Kochen aber werden sie krebsth und gleichen im Geschmack europäischen Krebsen". Kappler's later (1887) account is very similar, but he adds that the species does not live in holes (in contrast to *Ucides* and *Ocypode*), that the carapace is "spitzig oval", and that the chelae are "zylinderartig zulaufend". He continued "Sie sind bei 18 cm breit und halb so lang, rötlich-weiss von Farbe, werden aber beim Kochen hochrot, und gleichen im Geschmack mehr den Krebsen als den Krabben. Sie kommen selten ans Land und schwimmen ebenso schnell zur Seite als die Krabben in eben dieser Richtung laufen." The specimen collected by Spitzly (Mus. Leiden) was mentioned by Jentink (1888). Tesch (1914), who identified the Suriname species with *Callinectes danae*, remarked that "In Suriname wordt deze kraab in de zomermaanden of in het voorjaar, wanneer de vervelling juist is afgelopen en het nieuwe pantser nog zacht en week is, in ondiep water langs de kust met de hand gevangen, en tegen 2 of 3 cent per stuk van de hand gedaan" (In Suriname this crab is caught in the summer months or during the spring, when it has just moulted and the shell is still soft; it is taken by hand in the shallow coastal waters and sold for 2 or 3 cents apiece).

**Lupella forceps** (Fabricius, 1793)

## Coquette Investigations

N.N.W. of the mouth of the Marowijne River, about 30 miles offshore; depth 37 m; 29 April-3 May 1957; fifth voyage. — 3 males, 2 females (one ovigerous). (L)

Station 209, between the mouths of the Suriname and Marowijne Rivers, 6° 41' N 54° 33' W; bottom mud and shells; depth 40 m; 14 June 1957. — 1 female. (W)

Description. Rathbun, 1930, p. 133, pl. 57.

Remarks. The carapace breadth of the present specimens varies between 59 and 70 mm, in the ovigerous female it is 61 mm.

Type locality. "In Oceano" (Fabricius, 1793, p. 449).

Distribution. West Indies (Cuba to Martinique), now reported for the first time from Suriname.

**Cronius ruber** (Lamarck, 1818)

## Coquette Investigations

20 miles N. of the mouth of the Suriname River; depth 27 m; 6 to 9 May 1957; sixth voyage. — 1 male. (L)

Description. Rathbun, 1930, p. 139, pls. 62, 63.

Remarks. The single specimen examined has the carapace breadth 30 mm.

Type locality. Brazil.

Distribution. East coast of America from S. Carolina (U.S.A.) to S. Brazil and the West Indies, west coast of America from Lower California to Peru and the Galapagos Islands, and the west coast of Africa from Senegal to Angola. The species is now reported for the first time from Suriname.

## Family Xanthidae

**Glyptoxanthus vermiculatus** (Lamarck, 1818) (pl. VII)

## Coquette Investigations

Between the mouths of the Coppename and Suriname Rivers, 6° 38'—6° 55' N 55° 13'—55° 40' W; depth between 26 and 53 m; 19 to 22 July 1957. — 1 male. (L)

Description. Rathbun, 1930, p. 266, pl. 108 fig. 4, pl. 109.

Remarks. The present specimen has cb. 38 mm, cl. 26 mm. It perfectly agrees with the accounts given of this species in the literature.

Type locality. Unknown.

Distribution. Rathbun (1930) gave as the range of this species: "Curaçao, South America; Angola, West Africa". As Monod (1956, p. 297) has shown, the West African specimens brought by some authors to the present species actually belong to *Glyptoxanthus angolensis* (De Brito Capello). Odhner

(1925, p. 57) synonymized *Actaea maeandrina* Klunzinger, 1913, from the Red Sea with the present form, and even went so far as to consider the present species to be an Indo-West Pacific form, since at that time no fully positive West Indian records of it were known. Rathbun (1930) then proved that the species is definitely West Indian, since the U.S. National Museum possesses a female specimen taken by the Albatross Expedition near Curaçao. The present Suriname specimen seems to be the second to definitely prove the American origin of the species. Suriname and Curaçao at present are the only certain localities whence the species is known; if Odhner's supposition that the type of *Actaea maeandrina* Klunzinger is a juvenile of the present species is correct, then the species inhabits both the Indo-West Pacific and the West Indian regions.

**Medaeus spinimanus** (H. Milne Edwards, 1834)

Coquette Investigations

Station 33, N.E. of the mouth of the Suriname River, 6° 52' N 54° 53' W; bottom mud and shells; depth 51 m; 12 May 1957. — 1 female. (W)

Station 331, between the mouths of the Coppename and Suriname Rivers, 6° 51' N 55° 25' W; bottom mud and shells; depth 53 m; 20 July 1957. — 1 male. (L)

Description. Rathbun, 1930, p. 274, pl. 113.

Remarks. The female specimen has cb. 20 mm and cl. 15 mm, it has the carapace entirely covered by barnacles which are placed the one right next to the other, so that the dorsal structure of the carapace is entirely obscured. The male has cb. 28 mm and cl. 20 mm, it agrees perfectly with Rathbun's description and figure.

Type locality. Unknown.

Distribution. *Medaeus spinimanus* has been reported from the Bahama Islands, Guadeloupe, Dominica and Martinique. It was not known to occur near Suriname.

**Panopeus herbstii** H. Milne Edwards, 1834 (pl. VIII fig. 1)

Museum Leiden

North coast of Suriname near the mouth of the Matappica Canal, N. of the Commewijne River; among pieces of wood washed ashore; bottom firm mud; 6 April 1957; L. B. Holthuis no. 1222. — 1 female.

Description. Rathbun, 1930, p. 335, textfigs. 52, 53, pls. 156, 157.

Remarks. The specimen, cb. 32 mm, closely agrees with Rathbun's account of the species.

Type locality. North America.

Distribution. Bermuda and Massachusetts (U.S.A.) to S. Brazil and the West Indies. The species is now reported for the first time from Suriname.

**Eurytium limosum** (Say, 1818) (pl. VIII fig. 2)

"Krab" Jentink, 1906, p. 16.

Museum Leiden

Coronie; near the end of the canal where it empties into the sea; 23 November 1948; 1948-1949 Suriname Expedition no. 4571. — 1 male.

Swamp near "Geijersvlijt" plantation, Paramaribo; 15 December 1939; D. C. Geijskes. — 1 male.

Upper Suriname River; 19 November 1905; P. Buitendijk. — 1 male.

Description. Rathbun, 1930, p. 423, pl. 176 figs. 1, 2.

Remarks. The carapace breadths of the above three specimens range between 25 and 38 mm.

Type locality. "Shores of the northern states" of the U.S.A.

Distribution. Bermuda and New York (U.S.A.) to São Paulo (Brazil) and the West Indies. Graham's (1955, p. 33, pl. 4 fig. 6) Jumbie Crab from British Guiana is this species.

Occurrence in Suriname. In the 1905-1906 annual report of the Leiden Museum the specimen from the Upper Suriname River is mentioned by Jentink as "1 Krab". It is to be regretted that no more accurate indications as to the locality whence this specimen originates are known, it seems improbable that the specimen was found far up the Suriname River.

**Menippe nodifrons** Stimpson, 1859

Coquette Investigations

Station 86, off N.W. French Guiana, 5° 49.5' N 53° 09' W; bottom rocky with mud, coral, and shells; depth 27 m; 22 May 1957. — 2 specimens. (L + W)

Museum Leiden

Among growth on the sides of "Suriname Rivier" lightvessel; found when the ship was docked in Georgetown, British Guiana; 13 June 1950; D. C. Geijskes. — 1 female.

Description. Rathbun, 1930, p. 479, pl. 198 fig. 3, pl. 199.

Remarks. The "Coquette" specimens have cb. 14 and 25 mm, in the other specimen cb. is 18 mm.

Type locality. Indian River, Florida, U.S.A.

Distribution. Florida (U.S.A.) to S. Brazil and the West Indies. The species is now reported for the first time from the Guianas.

***Pilumnus diomedae*** Rathbun, 1894 (textfig. 48)

## Coquette Investigations

Station 337, off the mouth of the Suriname River,  $6^{\circ} 49' - 6^{\circ} 47' N$   $55^{\circ} 21' - 55^{\circ} 18' W$ ; bottom mud and fine shells; depth 49-53 m; 21 July 1957. — 1 male. (L)

Description. Rathbun, 1930, p. 501, pl. 202 figs. 2, 3.

Remarks. The specimen, cb. 19 mm, on the whole agrees with Rathbun's description. The frontal lobes are separated by a deep median incision. In their inner part they bear three distinct spines between which some tubercles or short spinules are visible; in their outer part there is a very strong curved spine near the antenna. The lower orbital margin bears seven or eight spines. In my specimen the fingers of the cheliped are of a dark purplish, almost

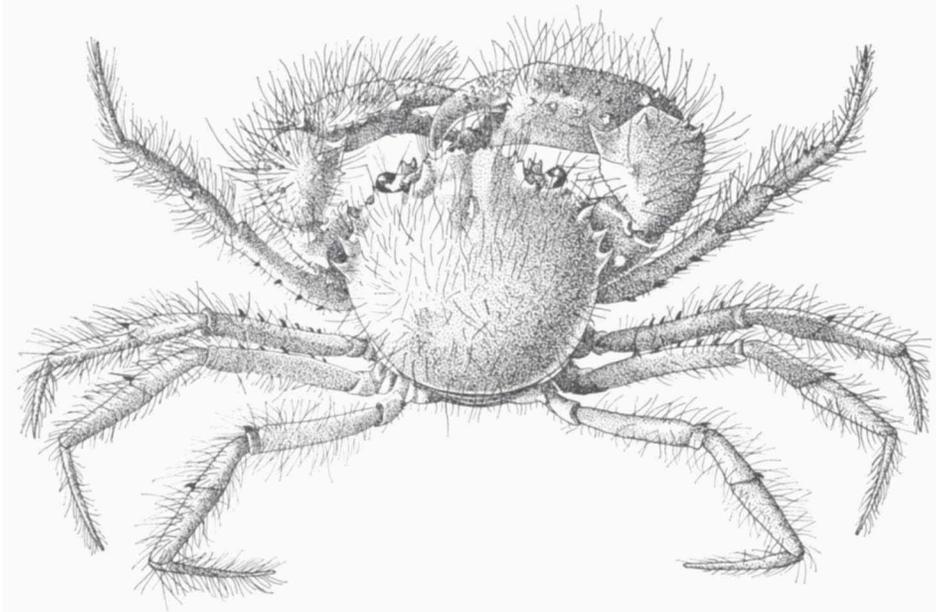


Fig. 48. *Pilumnus diomedae* Rathbun. Specimen from "Coquette" Sta. 337.  $\times 2.3$ .  
W. C. G. Gertenaar del.

black colour, which extends from the tip of the finger to close to its base. No spines are present on the propodus of the walking legs, though they are found on the merus und the carpus.

Type locality. Off Havana, Cuba,  $23^{\circ} 10' 40'' N$   $82^{\circ} 20' 15'' W$ ; depth 184 fathoms.

Distribution. Yucatan Channel and off Cuba; depth 130-184 fathoms. The species is now reported for the first time from Suriname, being found there at a considerably smaller depth than the other specimens reported upon in the literature.

**Carpilius corallinus** (Herbst, 1783),  
**Actaea setigera** (H. Milne Edwards, 1834),  
 and  
**Eriphia gonagra** (Fabricius, 1781)

The occurrence in Suriname of the above three species of Xanthidae is highly dubious. The Hamburg Museum possesses a male of *Carpilius corallinus*, and two males and an ovigerous female of *Eriphia gonagra* labelled "Surinam". Dr. A. Panning of the Hamburg Museum was so kind to inform me that the correctness of the labels of these specimens, like that of the male of *Calappa ocellata* (vid. p. 166 of the present paper), is not at all certain, the material may actually originate from Barbados. *Actaea setigera* was reported from Suriname by Neumann (1878, p. 21), but as pointed out on p. 14 of the present paper, it is more likely that Neumann's so-called Suriname material actually is of Antillean origin. The three Xanthids mentioned here all are rather typical inhabitants of coral reef habitats and therefore could hardly be expected to live on the muddy Suriname coast.

Family Potamonidae

Subfamily Trichodactylinae

**Trichodactylus (Valdivia) serratus** (White, 1847) (textfig. 49, 50a)

*Dilocarcinus* sp. Jentink, 1903, p. 11; Jentink, 1904, p. 6.

Museum Leiden

Near the Coppename River; 1901; 1901 Coppename Expedition. — 1 ovigerous female. Paramaribo; don. Koloniaal Museum, Haarlem, no. 18. — 1 male.

Coropina Creek near Republiek; 25-30 October 1946; D. C. Geijskes. — 2 males, 3 females.

Coropina Creek near Republiek; in holes in the bank of the creek and among dead leaves on its bottom; 9 April 1957; L. B. Holthuis no. 1231. — 7 males, 5 females.

Swamp near Coropina Creek, near Republiek; 26 April 1943; D. C. Geijskes. — 1 female.

Sectie O, on the railroad at about 70 km S. of Paramaribo; 7 June 1944; D. C. Geijskes. — 1 juvenile.

Feti Creek near its junction with the Litani River, upper reaches of the Marowijne basin; 6 August 1939; D. C. Geijskes. — 1 female.

Litani River near its junction with the Feti Creek, upper reaches of the Marowijne basin; between tree roots; 15 August 1939; D. C. Geijskes. — 1 male.

Suriname. — 1 female.

Museum Amsterdam

Paramaribo; don. Koloniaal Museum Haarlem. — 2 males.

Museum Hamburg

Upper Saramacca River; fresh water; C. Heller; received 28 May 1910. — 1 male. Paramaribo; J. Michaelis, received 30 September 1898; 1908, C. Heller. — 9 males, 2 females.

Para district; fresh water; 10 March 1909; C. Heller. — 1 male.

Upper Para River; J. Michaelis; received 13 June 1901. — 2 males.

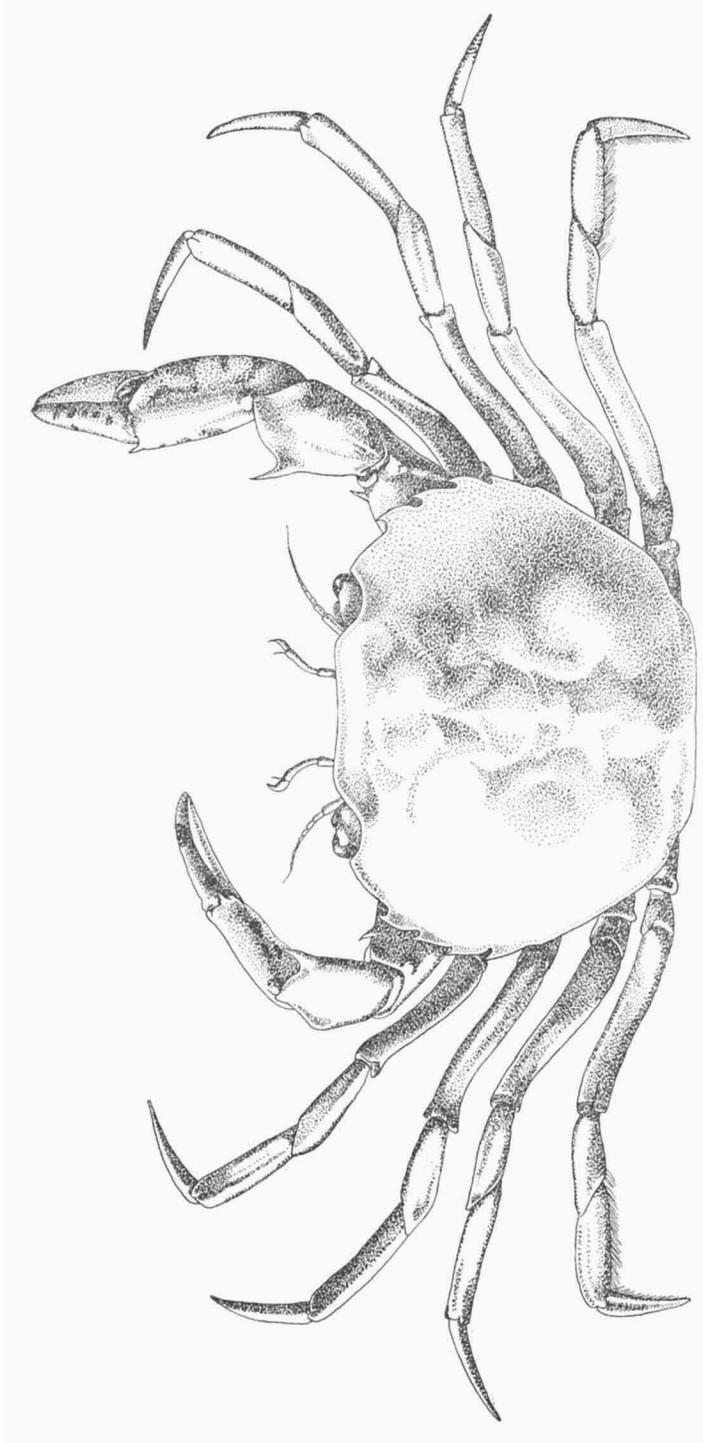


Fig. 49. *Trichodactylus (Valdivia) serratus* (White). Specimen from near Republic (L. B. Holthuis no. 1231).  $\times 1.8$ . W. C. G. Gertenaar del.

## Museum London

In a small stream near Zanderij; bottom mud; 21 August 1938; I. T. Sanderson no. 74 Cr. — 1 male.

Description. Rathbun, 1906, p. 47, textfig. 111; 1905, pl. 19 figs. 7, 8.

Vernacular name. The native name of the species in the Oajana Indian language of the region of the Litani River is "Waimoh".

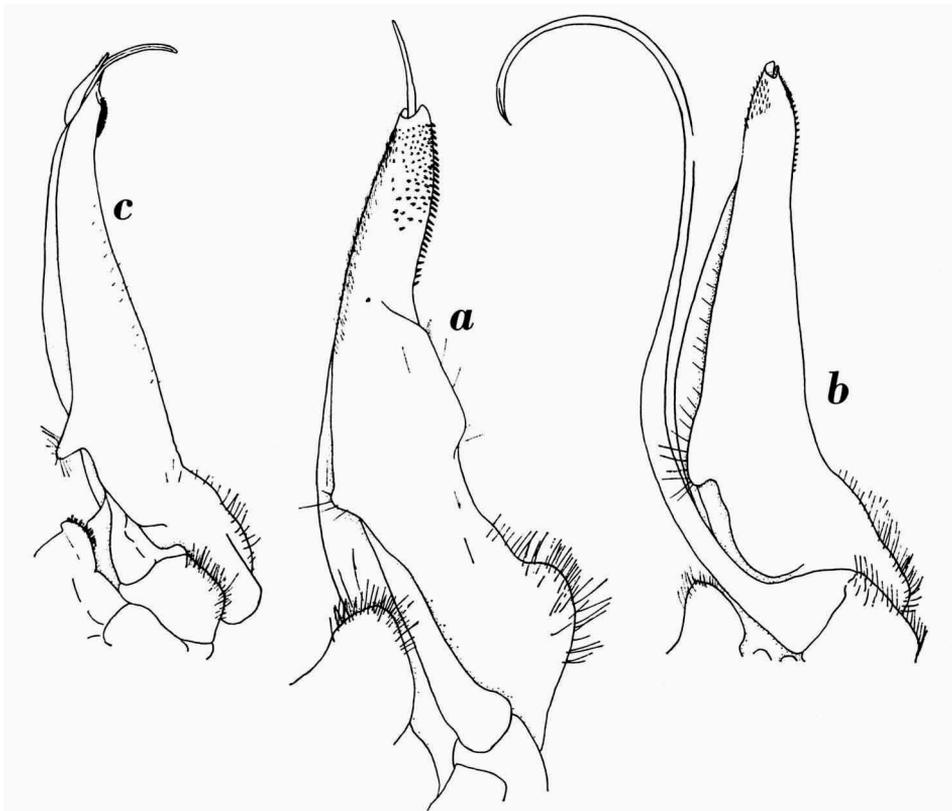


Fig. 50. First and second left male pleopods in posterior view. a, *Trichodactylus (Valdivia) serratus* (White); b, *Trichodactylus (Dilocarcinus) dentatus* (Randall); c, *Trichodactylus (Dilocarcinus) spinifer* (H. Milne Edwards). a, specimen from near Republiek (L. B. Holthuis no. 1231); b, specimen from Paramaribo (July 1911, W. C. van Heurn); c, specimen from 1948-1949 Suriname Expedition no. 1360. a,  $\times 13$ ; b, c,  $\times 7$ .

Remarks. The present specimens, which have cb. 6-40 mm and cl. 5-37 mm, agree with Rathbun's description and with that by Coifmann (1938, p. 94). The frontal margin is only very slightly emarginate and directed slightly upwards. The number of antero-lateral teeth varies between 4 and 5 (the orbital tooth excluded), the normal number is 4. The orbital tooth is less

distinctly pointed than the others and the distance between it and the next tooth is larger than that between the other teeth. Sometimes there is an indication of one (seldom two) additional denticles just behind the orbital tooth. The small tooth on the postero-lateral margin is variable in size; sometimes it is distinct though small, sometimes it is hardly at all noticeable. In some specimens traces of one or two more denticles may be observed on the postero-lateral margin. In the large specimens the carapace is naked, though finely punctate, in the smaller individuals a distinct pubescence is visible. The lateral and posterior margins of the carapace are carinate; the carinae being distinct almost throughout their course. The strongly elevated posterior margin, the flat or even somewhat concave front, and the flatter upper surface of the carapace immediately distinguish this species from the other Suriname representatives of the genus. The lower orbital border ends in a strong inner tooth. This inner tooth is separated by a deep and broad rounded incision from a second tooth which is smaller, has the top rounded, and is followed by some eight indistinct crenulations, some of which may be somewhat larger than the rest. Neither the male nor the female has a spine on the ischium of the cheliped; the merus of this leg has a distinct subterminal dorsal spine, a spine on the inner lower margin and an outer antero-ventral spine. The carpus has a single slender spine on the upper margin, and the palm has a small antero-dorsal spine; in the large cheliped of the large males, however, the latter spine is indistinct. Sometimes a carina is visible in the lower half of the outer surface of the palm of the chela.

The specimen mentioned by Jentink (1903, 1904) as *Dilocarcinus* spec. is still preserved in the collection of the Leiden Museum, it is the one labelled Paramaribo.

Colour. The carapace of the preserved specimens is of a dark olive colour with a red mottling consisting mainly of minute red speckles and short stripes. The walking legs have the same dark olive colour on which there are many dark specks. The chelae are dark olive dorsally, being lighter ventrally, and have large roundish dark red spots on the palm and the fingers. Such spots are present on the merus but are less distinct there. I. T. Sanderson in a field note concerning the specimen in the collection of the British Museum stated the colour of the living specimen to be "pale cream with bright violet spots, carapace all deep, violet brown".

Type locality. Unknown.

Distribution. The species is known from British Guiana, Suriname, and Brazil.

Occurrence in Suriname. *Trichodactylus serratus* is now reported for the first time from Suriname, where it seems to be not very rare. Coropina Creek,

whence the species has been collected several times, is a rather wide creek with perfectly fresh and acid water. We found the crabs in rather deep holes in the steep banks of the creek, but also many specimens were obtained by hauling a handnet through the layer of dead leaves on the bottom of the creek at a depth of 0 to 1.5 m.

**Trichodactylus (Dilocarcinus) dentatus** (Randall, 1840) (textfig. 50b, 51)

*Orthostoma dentata* Randall, 1840, p. 122.

*Orthostoma dentatum* Ortmann, 1897, p. 327.

Museum Leiden

Western part of Lucie River, Corantijn River basin, about 3° 32' N 57° 24' W; 1 December 1910; 1910-1911 Corantijn Expedition. — 1 male.

Pool near highway between Coronie and Paramaribo at 2.16 km E. of Coronie; in wood; December 1948; 1948-1949 Suriname Expedition, no. 4167. — 1 female carrying many young.

Three km west of the Coppename River, 7 km S. of the highway between Coronie and Paramaribo; March 1954; J. C. Lindeman. — 2 females (dry).

Agricultural Experiment Garden, Paramaribo; 18 April 1940 and 5 February 1941; D. C. Geijskes. — 15 juveniles.

In the banks of ditches, Paramaribo; July 1911; W. C. van Heurn. — 2 males, 2 females.

Paramaribo; 1911; W. C. van Heurn. — 1 female.

Suriname; 1883; C. J. Hering. — 1 female.

Museum Amsterdam

Near the Lucie River, Corantijn River basin, at about 3° 32' N 57° 25' W; in decayed wood; July-August 1926; 1926 Suriname Expedition to the Wilhelmina Range. — 4 juveniles.

Description. Rathbun, 1906, p. 65; 1905, pl. 20 fig. 4.

Remarks. The specimens vary in cl. between 4 and 52 mm. The female from 2.16 km E. of Coronie (cl. 52 mm) carried numerous young under the abdomen. The specimens closely agree with Rathbun's account of the species. *Trichodactylus dentatus* may immediately be distinguished from the other Suriname species of the genus by the presence of spinules on the distal margin of the front.

Coloured figures of the species were published by Young (1900, pls. 5, 6), who stated that it is named Eeta Crab in British Guiana.

Type locality. "Either from South America or the West Indies". It seems quite possible that Randall's material was collected in Suriname by C. Hering, and for that reason the type locality is restricted here to Paramaribo, Suriname.

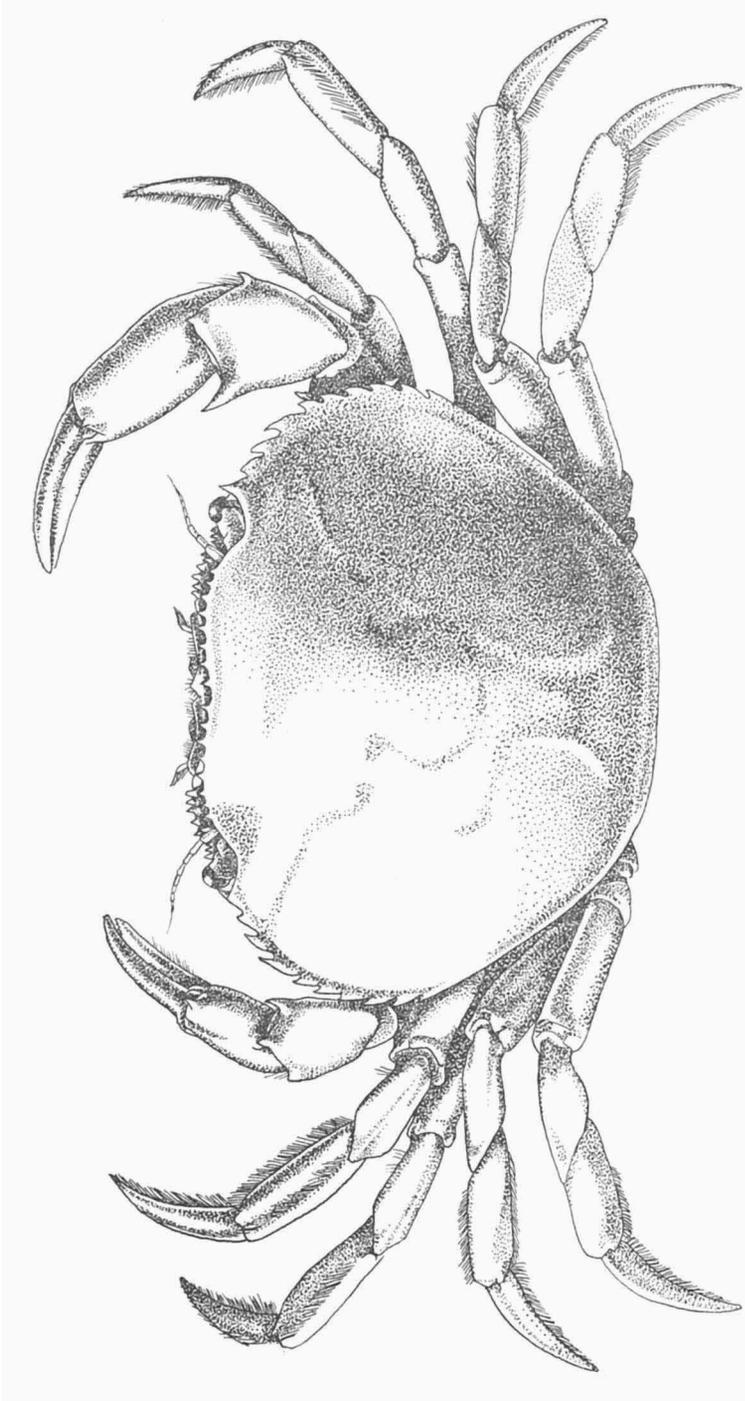


Fig. 51. *Trichodactylus (Dilocarcinus) dentatus* (Randall). Female specimen from Paramaribo (July 1911, W. C. van Heurn). X 1.8. W. C. G. Gertenaar del.

Distribution. Venezuela, British, Dutch, and French Guiana, Brazil. The Leiden Museum possesses material of the present species from E. Venezuela and Trinidad.

Occurrence in Suriname. Apart from the doubtful record by Randall, and Ortmann's (1897) observations on the type material, the present species has not before been reported from Suriname. The present material shows it to be not very rare in Suriname, where it evidently occurs closer to the sea coast than the preceding species.

**Trichodactylus (Dilocarcinus) spinifer** (H. Milne Edwards, 1853)

(textfigs. 50c, 52)

*Dilocarcinus spinifer* Young, 1900, p. 234.

Museum Leiden

Leonsberg, N. of Paramaribo; on the wall of a sluice near the Suriname River; 20 January 1939; D. C. Geijskes. — 1 male.

Swamp near Agricultural Experiment Garden, Paramaribo; 14 December 1939; D. C. Geijskes. — 1 male.

Paramaribo; August 1911; W. C. van Heurn. — 1 female.

Bushcreek near Sectie O, on the railroad about 70 S. of Paramaribo; 4 November 1942, and 7 June 1944; D. C. Geijskes. — 1 male, 1 female.

Makambi Creek near Kabel; 27 September 1938; D. C. Geijskes. — 3 males.

Suriname River near Kabel; 21 to 28 September 1938; D. C. Geijskes. — 1 male.

Third Swamp, 14.6 km S. of the sea shore near Wiawia Bank; 11 October 1948; 1948-1949 Suriname Expedition no. 1360. — 1 male.

Pool at the S. end of the Last Swamp, 13.3 km S. of the sea shore near the Wiawia Bank; 27 November 1948; 1948-1949 Suriname Expedition no. 3965. — 1 female.

Pool at the S. end of the Last Swamp, 13.7 km S. of the sea shore near the Wiawia Bank; 27 November 1948; 1948-1949 Suriname Expedition no. 3966. — 1 female.

Djai Creek, 8.4 km N. of Moengotapoe; 6 October 1948; 1948-1949 Suriname Expedition no. 1181. — 2 males, 2 females.

Acoté, on Tapanahoni River; in swamp; 16 February 1952; 1952 Medical Expedition. — 1 juvenile.

Apisiké, a village on the Upper Paru River, Brazil, just S. of the Suriname border, Grens Range; in forest creek; 20 April 1952; D. C. Geijskes no. 1262. — 1 male.

Museum Berlin

Fresh water near Paramaribo; C. Heller. — 2 males.

Museum Hamburg

Paramaribo; fresh water; 1908; C. Heller. — 2 males, 1 female.

Upper Suriname River; C. Heller; received 28 May 1910. — 1 male.

Museum London

Near Donderberg, about 6 miles east of the railway at 91.5 km S. of Paramaribo; in hole in dry rotten log; high forest without water; 4 November 1938; I. T. Sanderson, nos. 77Cr. and 78 Cr. — 2 males.

Suriname; 1938; I. T. Sanderson, no. 75 Cr. — 1 male.

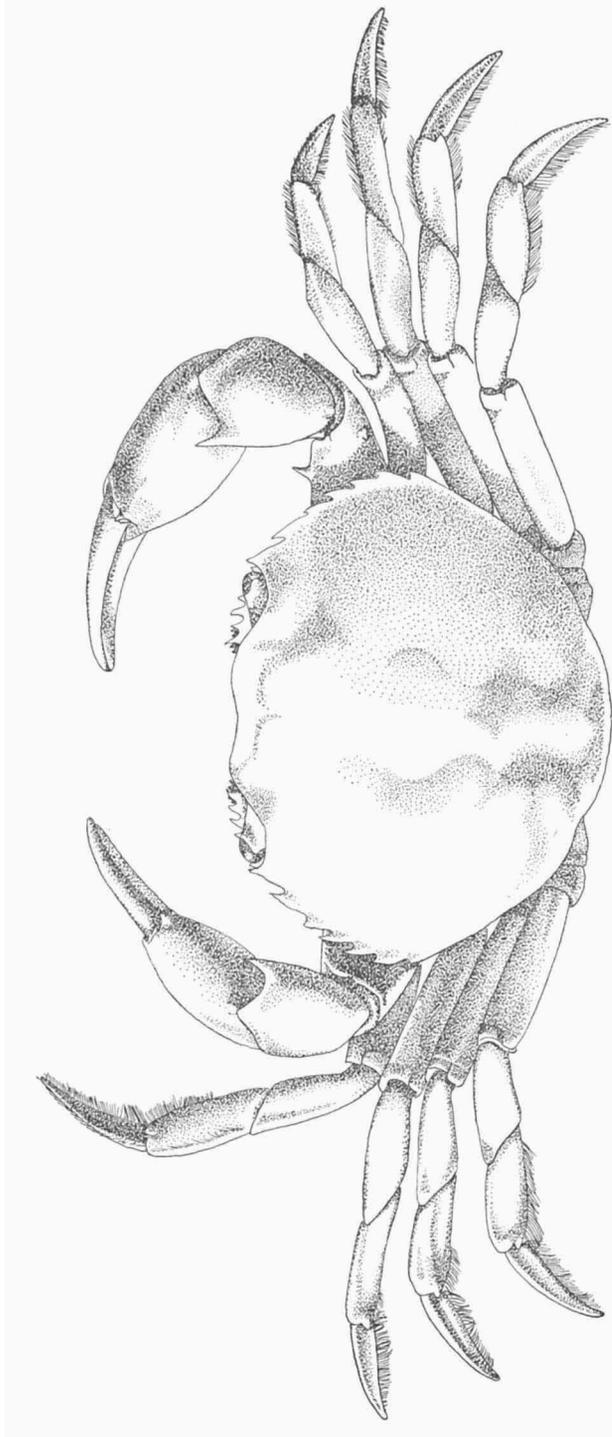


Fig. 52. *Trichodactylus (Dilocarcinus) spinifer* (H. Milne Edwards). Male specimen from 1948-1949 Suriname Expedition no. 1360. X 1.8. W. C. G. Gertenaar del.

Description. Rathbun, 1906, p. 60, textfig. 121; 1905, pl. 20 fig. 1.

Vernacular name. The species is named "káboe" (pronounce káhboo) by the bush negroes near Kabel.

Remarks. There is some variation in the depth of the frontal emargination, though in none of my specimens it is as deep as in the male of *Trichodactylus* (*Dilocarcinus*) *septemdentatus* (Herbst)<sup>1</sup>) from Rio Yacuma near Espiritu, Bolivia (leg. W. Forster & O. Schindler, 13-28 April 1954) with which I could compare them. The antero-lateral teeth behind the orbital tooth vary in number from six to seven, though usually the number is six. In my material no lobe is visible behind the last antero-lateral tooth. The number of spines on the lower orbital border varies from 6 to 9. The buccal carina bears 4 or 5 spines.

In the older males (cb. 36 to 50 mm) the ischium of the cheliped shows no spine but an inconspicuous tubercle on the lower surface near the distal margin. In females and young males (cb. 22 to 27 mm) a single slender spine is present there. The merus has a distinct subterminal spine on the dorsal margin and a well developed spine in the middle of the inner lower margin. In the older males about three blunt and very low tubercles may be seen on the lower outer margin of the merus, in the females and young males these tubercles are replaced by slender sharp spines; in all specimens this margin ends in a spine. The carpus shows a distinct inner anterior spine. The palm bears a small antero-dorsal spine. The fingers are slender and curve slightly inwards; they close practically over their entire length both in the males and in the females, and are longitudinally grooved.

The proximal part of the fused part of the male abdomen shows two blunt and wide submedian tubercles.

Rathbun (1906), who had only males of this species at her disposal, described the ischium and lower outer margin of the merus as being without spines. As shown by my specimens such spines are present in the females and young males.

Type locality. Cayenne, French Guiana.

Distribution. Dutch and French Guiana, Brazil.

Occurrence in Suriname. The species has been found in fresh waters in

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1) This species has been dealt with by Rathbun (1906, p. 58) under the name *T. (D.) orbicularis* (Meuschen). Since according Opinions 260 and 261 of the International Commission on Zoological Nomenclature (1954, Opin. Decl. Int. Comm. Zool. Nomencl., vol. 5, pp. 265-296) both the Museum Gronovianum (1778) and the Index to Zoophylacium Gronovianum (1781) are rejected for nomenclatorial purposes, the names proposed by Meuschen in these two publications are not available, and consequently the specific name *orbicularis* Meuschen cannot be used here.

the coastal region of Suriname from quite close to the sea (Leonsberg) to the anterior mountain range (Kabel); once a specimen has been found deep in the interior (Apisiké). Sanderson who found specimens in holes in a dry rotten log in a high forest remarked in a field note accompanying his above listed specimens no. 77 Cr. and 78 Cr. that "there is no water in this whole forest from August to January, and all crabs are in holes". As far as is known to me the only previous Suriname record of this species is that by Young (1900); it is possible, however, that his indication "Dutch Guiana" is a lapsus for "French Guiana".

Subfamily Pseudothelphusinae

**Potamocarcinus latifrons** (Randall, 1840) (textfigs. 53-56)

- Potamia latifrons* Randall, 1840, p. 120.  
 "Krabben" Kappler, 1887, p. 202.  
*Kingsleya latifrons* Ortmann, 1897, p. 324, pl. 17 fig. 7.  
*Potamocarcinus latifrons* Rathbun, 1898, p. 536; Rathbun, 1905, p. 311, textfig. 100, pl. 16 fig. 8; Geijskes, 1954, p. 68.  
*Pseudothelphusa* Bakhuis, 1902, p. 839.  
 "Krab" Geijskes, 1942, p. 23.

Museum Leiden

- Avanavero Falls, Kabalebo River, branch of the Corantijn River; March 1920; A. Reyne. — 1 male.  
 Fallawatra River, branch of the upper Nickerie River; October 1900; 1900 Nickerie Expedition. — 1 female.  
 Upper Nickerie River; September-October 1900; 1900 Nickerie Expedition. — 1 male.  
 Coppename River near the beginning of the Langadansoela Falls; 26 July 1943; D. C. Geijskes. — 1 male.  
 Upper Coppename River below the Sidonkroetoe Falls; 8 September 1901; 1901 Coppename Expedition. — 2 females.  
 Sidonkroetoe Falls, Coppename River; 30 July 1943; D. C. Geijskes. — 1 female.  
 Coppename River above the Tonckens Falls, near Magazijn Camp; 1 August 1943; D. C. Geijskes. — 1 female.  
 Rapids in Zuid Creek, upper Linker Coppename River, near base camp I; 15 August 1943; D. C. Geijskes. — 1 juvenile.  
 Upper Linker Coppename River near Wilhelmina Range, line I; August-September 1943; D. C. Geijskes. — 1 juvenile.  
 Coppename River; 1901; 1901 Coppename Expedition. — 2 males, 2 juveniles.  
 Toekoemoetoe Creek, branch of upper Saramacca River; 15 February 1903; 1902-1903 Saramacca Expedition. — 1 female.  
 Saramacca River near Mammaprati; 5 March 1958; D. C. Geijskes. — 1 female.  
 Upper Saramacca River; 1902; 1902-1903 Saramacca Expedition. — 2 males, 1 female.  
 Falls in the Suriname River near Kabel; 27 September 1938; D. C. Geijskes. — 1 juvenile.  
 Suriname River near Kabel; 21--28 September 1938; D. C. Geijskes. — 3 males, 1 female.  
 Suriname River N. of Kabel; shore; 1 September 1955; P. Wagenaar Hummelinck no. 644. — 2 males.

Suriname River N. of Kabel; among stones in the river and near the shore; 10 April 1957; L. B. Holthuis no. 1236. — 4 males, 6 females, 35 juveniles.

Suriname River near Gingré Soela; 29 November 1955; L. J. Schmidt. — 2 juveniles.

Suriname River near Bakra Oposton; 19 August 1942; L. J. Schmidt. — 1 male.

Suriname River near Mamadam; 17 August 1942; L. J. Schmidt. — 1 female.

Gran Rio, upper Suriname River basin; August 1910; 1910-1911 Corantijn Expedition. — 1 female.

Upper Gran Rio, Suriname River basin; September 1910; 1910-1911 Corantijn Expedition. — 1 female.

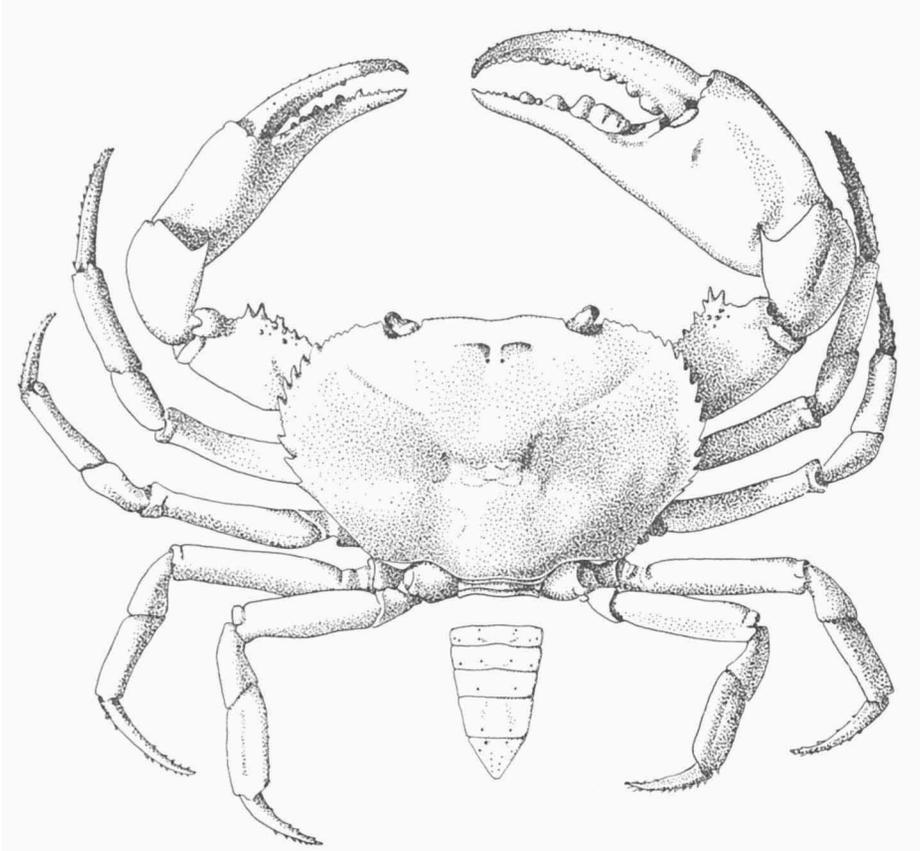


Fig. 53. *Potamocarcinus latifrons* (Randall). Male specimen from Apoema Falls.  $\times 0.7$ .  
W. C. G. Gertenaar del.

Marowijne River near Langatabbetje; in river; 19 February 1952; D. C. Geijskes. — 1 female.

Marowijne River near base camp,  $4^{\circ} 47' N$ ; among stones in the river near the shore; 12, 15, 16, 17, and 24 February 1949; 1948-1949 Suriname Expedition nos. 6418, 6640, 6826, 6923, 7465. — 2 males, 4 females, 2 juveniles.

Marowijne River, French shore opposite base camp,  $4^{\circ} 47' N$ ; in the river; 17 February 1949; 1948-1949 Suriname Expedition no. 6926. — 1 male, 1 female.

Marowijne River near Nassau Range; 1949; 1948-1949 Suriname Expedition. — 1 female.

Marowijne River near Alamoëke Soela; 10 February 1949; 1948-1949 Suriname Expedition no. 6419. — 1 female.



Fig. 54. *Potamocarcinus latifrons* (Randall). Left first male pleopod in posterior view. Specimen from 1948-1949 Suriname Expedition no. 7465.  $\times 4$ .

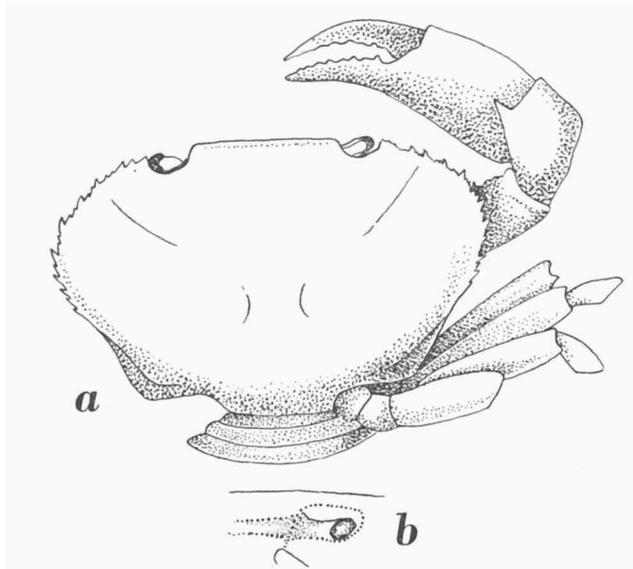


Fig. 55. *Potamocarcinus latifrons* (Randall), holotype. a, animal in dorsal view; b, orbit in frontal view. a, b, natural size. After Ortmann, 1897.

Marowijne River near Gran Creek, Nassau Range; 19 and 23 February 1949; 1948-1949 Suriname Expedition nos. 7029 and 7380. — 8 males, 18 females.

Marowijne River near the Apoema Falls; October 1953; D. C. Geijskes. — 2 males, 3 females.

Tapanahoni River near Manlobbi; river bank; 28 February 1952; 1952 Medical Expedition, no. 346. — 1 male, 1 female.

Gransoela, S. of Visiti, Tapanahoni River; in river among rocks; 8 March 1952; 1952 Medical Expedition, no. 520. — 1 male, 1 female.

Grandasingi Falls, Tapanahoni River; in river among rocks; 9 March 1952; 1952 Medical Expedition, no. 548. — 1 male, 1 female.

Paloemeu River near Kodobakoe Soela, Tapanahoni River basin; 3 July 1952; D. C. Geijskes. — 1 female.

Paloemeu River near Papadron Soela; 31 March 1952; 1952 Medical Expedition. — 1 female.

Lawa River near the junction with the Gonini River, Marowijne River basin; on stones in the river; 15 and 16 August 1903; 1903-1904 Gonini Expedition. — 1 male, 1 female.

Gonini River near Gransoela; rocks in the river; 17 August, 2 and 4 September 1903; 1903-1904 Gonini Expedition. — 1 male, 2 females.

Falls in Lawa River below Cottica; 4 July 1939; D. C. Geijskes. — 1 male, 1 female.

Falls in Lawa River near Bakavisiasang Island below Cottica; 4 July 1939; D. C. Geijskes. — 1 male, 1 female.

Litani River near Feti Creek; among stones; 20 August 1939; D. C. Geijskes. — 1 female.

Litani River above Loë Creek; under stones and rubbish; 3 and 4 August 1939; D. C. Geijskes. — 1 male, 1 female.

Litani River near Gransoela; 24 August 1939; D. C. Geijskes. — 2 males.

Upper Litani River near Alama Creek; 2 August 1939; D. C. Geijskes. — 1 male.

Falls in upper Litani River; among stones; 2 August 1939; D. C. Geijskes. — 1 male.

Marowijne basin; 1903-1904; 1903-1904 Gonini Expedition. — 2 juveniles.

Suriname; 1891; H. F. C. ten Kate. — 1 male, 2 females.

Suriname; 1948-1949 Suriname Expedition. — 2 males.

Suriname. — 1 male, 1 female.

St. Martin Group, Netherlands Antilles; 1906; J. Boldingh. — 2 females.

#### Museum Amsterdam

Avanavero Falls, Kabalebo River, Corantijn River basin; March 1920; A. Reyne. — 1 female.

Western part of the Lucie River, Corantijn River basin, at about 3° 32' N 57° 25' W; everywhere in rocky places along the shores; July-August 1926; 1926 Suriname Expedition to the Wilhelmina Range no. 127. — 1 male, 1 female.

Saramacca River; 1922; 1922 Expedition to Hendrik Mt. — 1 female.

#### Museum Hamburg

Upper Suriname River near Berg en Dal, about 70 km S. of Paramaribo; August 1908; C. Heller. — 4 females.

#### Museum London

Camp I on Coppename River above Kaaimanston; herb-covered bank by river; 8 July 1938; I. T. Sanderson, no. 72 Cr. — 1 ovigerous female.

Description. Rathbun, 1905, p. 311, textfig. 100, pl. 16 fig. 8.

Vernacular names. The Suriname name of the species is "kraboe" (Geijs-

kes, 1954, p. 68), which, however, also is used as a term to indicate crabs in general. In Dutch, *Potamocarcinus* is named "rivierkrab" (river crab) or "gewone rivierkrab" (common river crab).

Remarks. The carapace breadths of the present specimens vary between 5 and 89 mm, being 70 mm in the ovigerous female. The species may be immediately distinguished from the other Suriname Pseudothelphusinae by that the antero-lateral border of the carapace bears distinct teeth, which are already noticeable in the smallest specimens.

The species exhibits a curious sexual dimorphism in the shape and colour of the dactylus of the second pereopods. In the females and young males this dactylus does not differ in shape and colour from the dactyli of the following legs, but in adult males it is larger, higher, and somewhat swollen, while the distal third is of a black colour. A similar black colour is visible on the tip of the dactylus of the chelipeds of both sexes.

The left first male pleopod is figured here in posterior view (fig. 54). At first sight it seems to differ strongly from the figure provided by Coiffmann (1938, p. 97, fig. 1), but the latter evidently represents the right pleopod in external lateral view.

Colour. Preserved specimens are dark reddish or greyish brown above, more yellowish below. The black colour of the tips of the dactyli of the first and second pereopods has already been mentioned above. In the field notes accompanying the material of the British Museum, I. T. Sanderson noted the specimen to be "dull greyish-brown above, yellowish cream below" when living. Young (1900, pl. 4) provided a coloured figure of the species.

Type locality. The type "is supposed to have been brought from Suriname, or the West Indies" (Randall, 1840). As the species does not occur in the Antilles, it is quite evident that the latter locality is not correct; furthermore the species is a very common form in the Suriname interior. Therefore I hereby restrict the type locality to Suriname.

Distribution. British, Dutch, and French Guiana. The specimens in the collection of the Leiden Museum indicated as originating from the Netherlands Antilles probably have been incorrectly labelled and may actually originate from Suriname.

Occurrence in Suriname. This species is probably the most common freshwater crab of Suriname. It has not been found in the coastal region, but only in the interior and in the anterior mountain range. It lives in the larger rivers in clear water among stones, often near falls or rapids. In the smaller creeks it seems to be entirely replaced by the species of the genus *Pseudothelphusa*. The first Suriname record is the one by Randall, who described the species as new; Randall probably based himself on material which was collected in Suri-

name by C. Hering and donated to the Philadelphia Academy of Sciences. Kappler's (1887, p. 202) remark: "Auch in den Flüssen des oberen Landes finden sich Krabben, die häufig ans Land kommen, aber doch meist im reinen Flusswasser leben. Sie sind braun, nicht über 4 cm lang bei einer Breite von 9 cm. Sie werden nicht gegessen" evidently refers to the present species. Ortman (1897) gave the measurements and a figure of Randall's type, and erected the new genus *Kingsleya* for the species. Rathbun (1898, 1905) referred to the type, but gave no new information on Suriname material. The



Fig. 56. Map showing the distribution of *Potamocarcinus latifrons* (Randall) in Suriname.

specimens mentioned by Bakhuis (1903) as *Pseudothelphusa* and those which Geijskes (1942, p. 23) casually mentioned in his report are preserved in the Rijksmuseum van Natuurlijke Historie and prove to belong to the present species. Geijskes (1954, p. 68) gave some interesting data on *Potamocarcinus latifrons*: "De gewone rivierkrab die overal tussen stenen te vinden is, wordt bij gebrek aan beter vaak gegeten. De dieren worden gekapt, of met de [p. 69:] hand gevangen en niet zelden treft men ze ook op het aas in de baskieten aan, maar men vangt ze vooral in de masoewa" (The common river crab, which is found everywhere among stones, is often eaten by the bush

negroes for want of something better. The animals are taken by killing them with chopping knives or they are caught by hand. They are also quite often found on the bait of "baskiets", fish traps which are provided with a trap door; but they are mostly obtained in "masoewas", fishing baskets which are made of palm leaves and baited with the intestines of game).

***Pseudothelphusa denticulata*** (H. Milne Edwards, 1853)

(textfigs. 57a-d, pl. IX figs. 1, 2)

Museum Leiden

First forest creek between the Raleigh Falls in the Coppename River and the Voltz Mt.; in the stomach of an electric eel, *Electrophorus electricus* (L.); 22 August 1957; D. C. Geijskes. — 1 male, 1 female.

Region of Kroetoe Mt., near Rechter Coppename River; 24 November 1943; D. C. Geijskes. — 2 juveniles.

Near Tafel Mt.; line III; 6 November 1943; D. C. Geijskes. — 1 male.

In falls of the Koesoewe Creek near first camp, line to Tafel Mt.; 27 March 1958; D. C. Geijskes. — 2 juveniles.

Zand Creek near Kwatta camp, Wilhelmina Range, line I km 3.2; 2 September 1943; D. C. Geijskes. — 1 juvenile.

Bush creek, 5.7 km W. of Linker Coppename River, Wilhelmina Range, line II km 5.7; 16 September 1943; D. C. Geijskes. — 1 juvenile.

Small bush creek near Sectie O on the railroad 69.5 km S. of Paramaribo; 6 February and 4 November 1942; D. C. Geijskes. — 2 males.

Makambi Creek near the railroad at 121 km S. of Paramaribo; near quarry; 30 November 1949; C. Bleys. — 1 female.

Upper course of Makambi Creek near the railroad at 121 km S. of Paramaribo; 30 November 1949; C. Bleys. — 1 female.

Upper course of a small stream (creek I) from the Browns Mt.; 15 September 1938; D. C. Geijskes. — 1 male.

Below waterfall (first fall), Browns Mt.; 17 September 1938; D. C. Geijskes. — 7 juveniles.

Lai Creek near Weyneweg, Moengotapoe; 21 September 1948; 1948-1949 Suriname Expedition no. 415. — 1 male.

Nassau Range, forest 1.5 km W. of the Marowijne River at 4° 47' N; 21 February 1949; 1948-1949 Suriname Expedition no. 7304. — 1 male.

Nassau Range, in forest creek 2 km W. of the Marowijne River at 4° 47' N; 16 and 25 February 1949; 1948-1949 Suriname Expedition nos. 6828 and 7646. — 1 male and 1 juvenile.

Nassau Range, in forest creek 2.1 km W. of the Marowijne River at about 4° 47' N; 19 February 1949; 1948-1949 Suriname Expedition no. 7040. — 1 male.

Nassau Range, in small forest creek 3.6 km W. of the Marowijne River at 4° 47' N; 8 and 11 March 1949; 1948-1949 Suriname Expedition nos. 8357 and 8698. — 4 males, 1 female.

Nassau Range, small creek 5.9 km W. of the Marowijne River at 4° 47' N; 10 March 1949; 1948-1949 Suriname Expedition no. 8642. — 1 female.

Nassau Range, small creek 6.8 km W. of the Marowijne River at 4° 47' N; 8 March 1949; 1948-1949 Suriname Expedition no. 8365. — 1 male.

Nassau Range, in small creek 7 km W. of the Marowijne River at about 4° 47' N; first half of March 1949; 1948-1949 Suriname Expedition. — 1 male. (dry)

Nassau Range, Bleeders Creek, 7 km W. of the Marowijne River at about 4° 47' N;

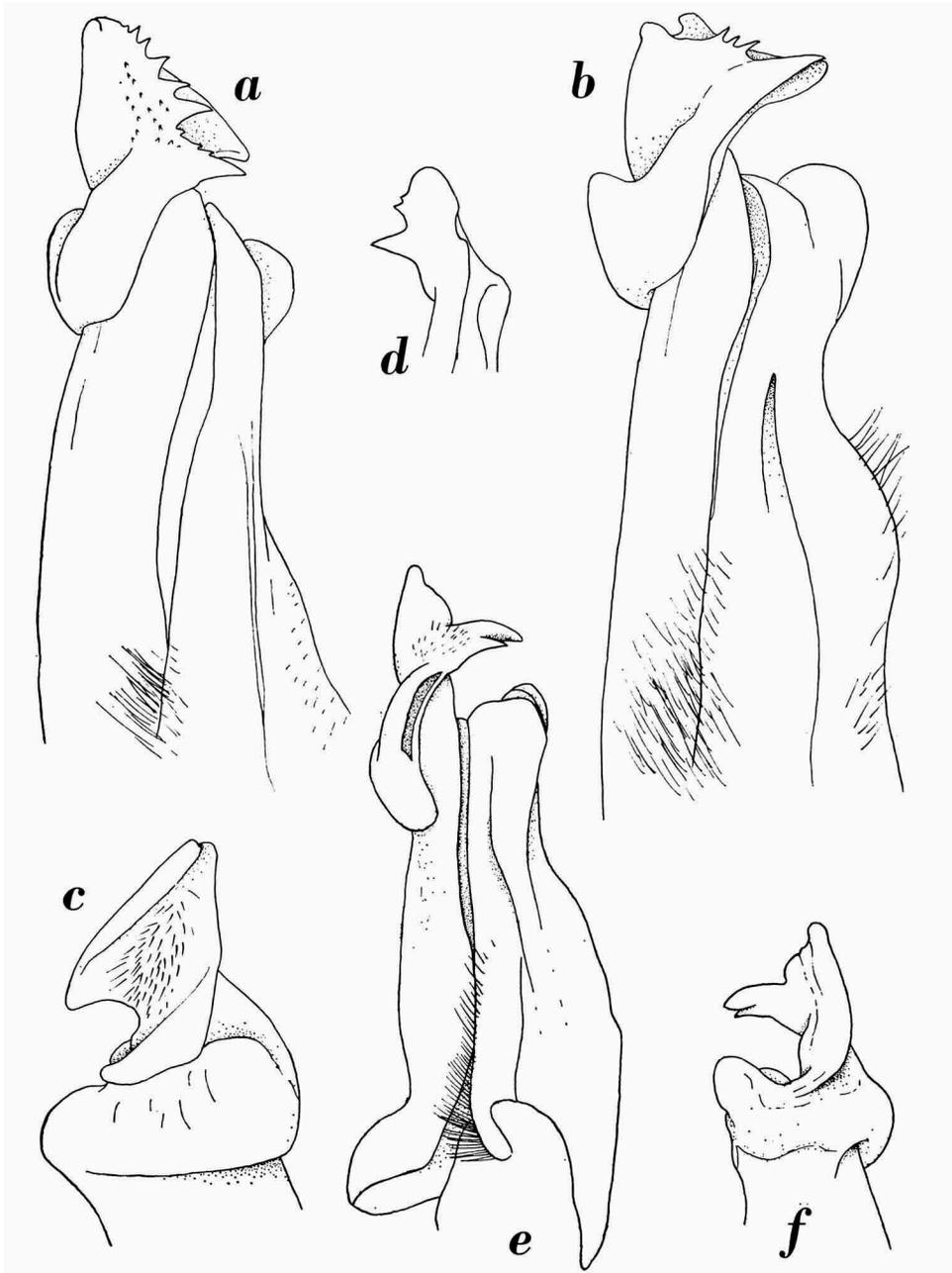


Fig. 57. *Pseudothelphusa denticulata* (H. Milne Edwards). a, b, left first male pleopod in posterior view; c, tip of left first male pleopod in anterior view; d, tip of left first pleopod of juvenile male in posterior view. a, c, specimen from 1948-1949 Suriname Expedition no. 7304; b, d, specimens from 1948-1949 Suriname Expedition no. 8357. *Pseudothelphusa colosii* Coifmann. e, left first male pleopod in posterior view; f, tip of left first male pleopod in anterior view. e, f, specimen from 1948-1949 Suriname Expedition no. 8078. a-c,  $\times 10$ ; d,  $\times 25$ ; e, f,  $\times 7$ .

7 March 1949; 1948-1949 Suriname Expedition nos. 8328, 8364. — 1 male, 4 juveniles. Nassau Range, creek 11.2 km W. of the Marowijne River at about 4° 47' N; 15 March 1949; 1948-1949 Suriname Expedition nos. 9007, 9009, 9017. — 4 males, 1 female, 5 juveniles.

Apisiké, a village on the upper Paru River, Brazil, just S. of the Suriname border, Grens Range; 15-20 April 1952; 1952 Medical Expedition. — 1 female.

Small creek near Waremapan Creek, branch of the Litani River, Marowijne basin, Toemoek-Hoemak Range; 31 July 1939; D. C. Geijskes. — 2 males.

#### Museum Amsterdam

Near western part of Lucie River, Corantijn basin, about 3° 32' N 57° 25' W; in decayed wood; July-August 1926; 1926 Suriname Expedition to the Wilhelmina Range. — 2 females.

#### Museum Hamburg

Paramaribo; November-December 1908; C. Heller. — 1 female.

Description. Rathbun, 1905, p. 305, textfig. 96.

Remarks. The specimens examined have the carapace breadths varying between 6 and 91 mm, the carapace lengths between 5 and 60 mm. In a number of characters the present material proves to be rather variable.

The carapace is rather flat, though it is somewhat arched from before backwards; in some specimens it is more convex than in others. The post-frontal lobes are as a rule visible, though they are not always very distinct. The region between these lobes and the front is flat and almost horizontal, differing in this respect from the other species of *Pseudothelphusa* dealt with here. The cervical groove is straight, becoming indistinct near the anterolateral margin of the carapace. The upper frontal border is straight, but sometimes interrupted in the middle. The lower frontal border is usually somewhat emarginate in the middle, but in several specimens this emargination is lacking. The antero-lateral margin of the carapace is finely denticulate.

The shape of the male abdomen is also subject to some variation. The telson is triangular, being slightly to distinctly broader than long. The lateral margins of the telson may be about straight or slightly concave.

The fingers of the cheliped are longitudinally grooved and provided with longitudinal rows of tubercles. The grooves are always distinct, even in the juveniles. The teeth of the fingers in the larger chela of the males are large and heavy, they are regularly divided over the cutting edges. The fingers close over their entire length, even in adult males. The palm of the chela in the large males is smooth except for some inconspicuous granules on the upper surface and a distinct single or double row on the lower surface. The latter row is most distinct in its proximal part. In smaller specimens some

granules may be seen on the outer surface of the palm, these granules generally being placed in longitudinal lines.

The first male pleopod also shows some variation. The distal flap may carry anything between three and more than ten teeth, while furthermore the position of its distal end is not always the same in different individuals. In juveniles the distal flap has the inner margin not yet turned outwards, so that the teeth are directed inwards. In very small males (cb. 19 mm or less) only the proximal of the teeth of the distal flap is visible.

Colour. In preserved adult specimens the carapace is generally of a dark purplish black colour, being much darker than the legs which are olive dorsally, more yellowish or greyish brown ventrally. The anterior surface of the merus of the chelipeds is sometimes reddish brown. The fingers of the chela are blackish except in their basal part; the teeth are brownish. In smaller specimens the fingers are reddish brown with greyish brown tips.

According to Rathbun (1905) there seem to be three species of *Pseudothelphusa* in the Guianas which have the male pleopod with the outwards turned inner margin of the distal flap showing a series of teeth which diminish in size distally. These species are *P. denticulata* (H. Milne Edwards, 1853), *P. geayi* Nobili (1904) and *P. angusta* Rathbun (1905). The specimens of *P. denticulata* seen by Rathbun had cb. 33.8 and 45 mm, those of *P. angusta* were 32.7 and 35 mm broad, while the type of *P. geayi* had cb. 73 mm. Rathbun separated *P. geayi* from *P. denticulata* and *P. angusta* by the flatter carapace. In my material this character varies somewhat, but since the convexity of the carapace of neither of the three species has been described or figured in detail, little can be said about the value of this character without a direct comparison of the present material with the types. The difference in the shape of the front of *P. denticulata* and *P. angusta*, as mentioned by Rathbun, seems to be of extremely little value, as both types of front are present in my material, while it proved to be impossible to distinguish two groups on that character. At first view *P. angusta* seems to have the carapace narrower than *P. denticulata*, but on a closer examination also this character proves to be no good. In my larger specimens (cb. 25-91 mm) the ratio cb/cl varies between 1.45 and 1.59, the females as a rule being somewhat broader than the males. Smaller specimens are relatively less broad than the larger. In specimens with cb. 6-20 mm the ratio cb/cl varies between 1.20 and 1.46. In Rathbun's *P. denticulata* specimens this ratio was 1.50 and 1.57, in her specimens of *P. angusta* it was 1.49 and 1.47, and in the type of *P. geayi* 1.49. All these values thus fall within the range shown by my material. There seem therefore to be no clear cut characters which make it possible to separate

the three species, and in my opinion it is highly probable that they should be synonymized. A reexamination of the types, however, is necessary for a final solution of this problem.

Type locality. Cayenne.

Distribution. *P. denticulata* has been reported from British and French Guiana and Brazil, *P. angusta* from French Guiana and Brazil, *P. geayi* from French Guiana.

Occurrence in Suriname. The species is found in small freshwater mountain creeks in the interior of Suriname, extending its range slightly into the southern part of the coastal region. It has never been found together with *Potamocarcinus* (which is essentially a species of the larger rivers), but seems to live in about the same circumstances as the other species of *Pseudothelphusa*. For this reason *Potamocarcinus* is named "river-crab" in Suriname and the *Pseudothelphusa* species "creek-crabs". Though the species is far from rare, until now it has not been reported in the literature as occurring in Suriname. The specimen in the Hamburg Museum probably is incorrectly labelled "Paramaribo", since the species seems not to come that close to the sea coast.

***Pseudothelphusa colosii*** Coifmann, 1938 (textfigs. 57e, f; pl. X figs. 1, 2)

Museum Leiden

Bakhuis Range near Coppename River; line V; 11 December 1943; D. C. Geijskes. — 1 female.

Wilhelmina Range, line I; August-September 1943; D. C. Geijskes. — 1 female.

Sara Creek, branch of the Suriname River, near gold placer Van Hemert; May 1941; A. M. H. Hermans. — 1 male.

Suhoza, Suriname River, south of Cassipora Creek; camp V; in forest creek at 15 km from the river; May 1953; J. C. Lindeman. — 1 male (dry).

Nassau Range, 8 km W. of the Marowijne River at about 4° 47' N; 4 March 1949; 1948-1949 Suriname Expedition no. 8078. — 1 male.

Nassau Range, in creek 11.2 km W. of the Marowijne River at about 4° 47' N; 16 March 1949; 1948-1949 Suriname Expedition no. 9062. — 1 male.

In creek near Joeloe, Upper Paloemeu River, Marowijne basin; final camp; 7 April 1952; 1952 Medical Expedition. — 1 male.

Forest creek near Apisiké, Upper Paru River, Brazil, just S. of the Suriname border, Grens Range; 20 April 1952; 1952 Medical Expedition, no. 1262. — 1 female.

Museum Amsterdam

Suriname; 1922; 1922 Expedition to Hendrik Mt. — 1 female.

Museum London

Camp I on Coppename River above Kaaimanston; in water in hole of tree bole, far from the river; high forest; 2 July 1938; I. T. Sanderson, no. 71 Cr. — 1 female.

Near Donderberg, about 6 miles east of the railway at 91.5 km S. of Paramaribo; in hole in dry rotten log; high forest without water; 4 November 1938; I. T. Sanderson no. 76 Cr. — 1 male.

Description. Coifmann, 1938, p. 102, textfigs. 3, 4b, pl. 3 figs. 3, 4.

Remarks. The carapace breadths of the specimens examined range from 26 to 61 mm, the carapace lengths from 18 to 40 mm.

*Pseudothelphusa colosii* shows some resemblance to *P. denticulata* but differs in a number of points. In the present species the carapace is always more convex than in the most convex specimens of *P. denticulata* seen by me, especially the branchial and gastric regions are more swollen, so that the cervical groove is deeper. The region between the front and the post-frontal lobes is flat like in *P. denticulata*, but it is not horizontal, being directed obliquely downwards anteriorly. The upper frontal margin, like in *P. denticulata*, is carinate and granular; it is usually incised in the middle, the two halves being convex. The orbits are short and are practically entirely filled by the eyes; in *P. denticulata* the orbits are relatively wider and the eyes relatively smaller. The cervical groove in *P. colosii* is sinuous, while in *P. denticulata* it is straight.

In *P. colosii* the fingers of the chelipeds show some longitudinal lines of granules, but they are not grooved, furthermore they are relatively longer than in *P. denticulata*, being as a rule longer than the palm. Even in the adult males the fingers close over their entire length. The cutting edges show several large teeth which are regularly distributed over the edges. The walking legs of the present species are more slender than in the preceding.

The most striking difference between *P. colosii* and *P. denticulata* is the one shown by the first pleopods of the males. In *P. colosii*, like in *P. denticulata*, the inner part of the distal flap of this pleopod is folded over outwards, so that the teeth on the inner margin are now directed outwards. The folded part is much narrower than in *P. denticulata* and the number of teeth is constantly two, of which the proximal is distinctly smaller than the distal. The shape of the pleopod of *P. colosii* is rather similar to that of *P. reflexifrons* (Ortmann), in which, however, the distal end of the flap is much shorter.

Colour. Like in *P. denticulata* the carapace of adult specimens is very dark, almost black; it is far darker than the legs which are olive brown or reddish brown above, and more yellowish brown below. The fingers of the chelipeds are not noticeably darker than the palm, being greyish or yellowish brown. Sanderson described his living specimen no. Cr. 71 (Mus. London) to be "brown above, yellow below; chelae reddish orange at joints".

Type locality. Fawacuri on the Berbice River, British Guiana.

Distribution. *P. colosii*, which has been described only as recently as 1938, to my knowledge has not been reported upon since the original publication. The closely related *P. reflexifrons* was originally described from the upper Amazon River, while Rathbun (1905) mentioned a specimen which was probably incorrectly labelled "Antilles".

Occurrence in Suriname. In Suriname the species inhabits small creeks just as does the preceding species. It is sometimes found out of the water in humid places (e.g., decaying wood), as were the specimens present in the collection of the British Museum. Sanderson, who collected them, made the remark that the forest near Donderberg where one of the crabs was collected, had no water from August to January and that all the crabs then were in holes.

Judging by our material this is the least common of the three species of *Pseudothelphusa* now known from Suriname.

***Pseudothelphusa wymani*** Rathbun, 1905 (textfig. 58; pl. VIII figs. 3, 4)

*Pseudothelphusa Wymani* Rathbun, 1905, p. 291, fig. 83.

„bruine krabben" Geijskes, 1942, p. 65; Geijskes, 1957, p. 242.

*Pseudothelphusa geayi* Geijskes, 1954, p. 69. (not *P. geayi* Nobili)

Museum Leiden

Bakhuis Range, near Coppename River, line V; 11 December 1943; D. C. Geijskes. — 1 male, 1 female, 1 juvenile.

Creek near Tafel Mt.; August 1944; L. J. Schmidt. — 1 female.

Falls near first camp near Tafel Mt.; 27 March 1958; D. C. Geijskes. — 1 male.

Wilhelmina Range near Linker Coppename River, line I; August-September 1943; D. C. Geijskes. — 1 male.

In the forest near the railroad at 121 km S. of Paramaribo; 21 April 1949; D. C. Geijskes no. 9652. — 1 female.

Creek near the railroad at 121 km S. of Paramaribo, W. of high rock; 14 July 1949; C. Bleys. — 1 female (dry).

Lolobroki Creek near the railroad at 121 km S. of Paramaribo, below the fall; 30 November 1949; C. Bleys. — 1 male.

Lolobroki Creek near the railroad at 121 km S. of Paramaribo, above the big fall; 30 November 1949; C. Bleys. — 2 males, 1 female.

Makambi Creek near railroad at 121 km S. of Paramaribo; 30 November 1949; C. Bleys. — 2 males.

South side of Browns Mt., near fall in small creek; 16 September 1938; D. C. Geijskes. — 1 female.

Below second fall in small creek, Browns Mt.; 18 September 1938; D. C. Geijskes. — 1 female.

Small creek near the summit of Browns Mt.; 16 September 1938; D. C. Geijskes. — 1 female, 1 juvenile.

Waktibasoe Creek near goldmining camp near Browns Mt.; 10 August 1958; D. C. Geijskes. — 2 ovigerous females.

Browns Mt.; eating from *Dictyophora*; den. Zoological Laboratory, Utrecht. — 1 female.

Nassau Range, creek 3.6 km W. of the Marowijne River at 4° 47' N; 8 March 1949; 1948-1949 Suriname Expedition no. 8357. — 1 female.

Nassau Range, small creek 5.9 km W. of the Marowijne River at about 4° 47' N; 10 March 1949; 1948-1949 Suriname Expedition no. 8643. — 1 male.

Nassau Range, creek 6 km W. of the Marowijne at about 4° 47' N; 19 February, 5-11 March 1949; 1948-1949 Suriname Expedition nos. 7039, 8043, 8187, 8695. — 6 males, 2 females, 5 juveniles.

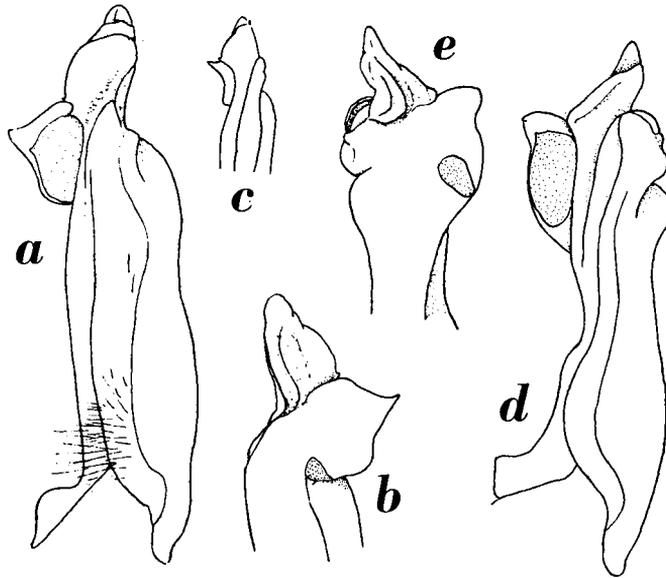


Fig. 58. *Pseudothelphusa wymani* Rathbun. a, c, d, left first male pleopod in posterior view; b, e, top of left first male pleopod in anterior view. a, b, specimen from 1948-1949 Suriname Expedition no. 7957; c, juvenile from 1948-1949 Suriname Expedition no. 7956; d, e, specimen from Bakhuis Range. a-e,  $\times 10$ .

Nassau Range, camp 6 km W. of the Marowijne River at about 4° 47' N; 24 February and 6 March 1949; 1948-1949 Suriname Expedition nos. 7466, 8224. — 2 females.

Nassau Range, near creek 6.8 km W. of the Marowijne River at about 4° 47' N; 2 and 12 March 1949; 1948-1949 Suriname Expedition nos. 7956, 8782. — 1 male, 2 juveniles.

Nassau Range, small creek 7 km W. of the Marowijne River at 4° 47' N; 2 March 1949; 1948-1949 Suriname Expedition no. 7957. — 1 male.

Nassau Range, Bleeders Creek, 7 km W. of the Marowijne River at about 4° 47' N; 7 and 14 March 1949; 1948-1949 Suriname Expedition nos. 8364, 9004. — 1 male, 1 female.

Nassau Range, forest at 9.2 km W. of the Marowijne River at 4° 47' N; 4 and 9 March 1949; 1948-1949 Suriname Expedition nos. 8079, 8544. — 1 male, 1 female.

Nassau Range, creek 11.2 km W. of the Marowijne at about 4° 47' N; 15 March 1949; 1948-1949 Suriname Expedition no. 9009. — 1 male, 2 females.

Nassau Range, 13 km W. of the Marowijne River at about 4° 47' N; 19 March 1949; 1948-1949 Suriname Expedition no. 9372. — 1 male, 1 female.

Nassau Range, creek at 14.5 km W. of the Marowijne River at about 4° 47' N; 16 March 1949; 1948-1949 Suriname Expedition no. 9061. — 1 female.

Lawa River, Marowijne basin; 1903; 1903-1904 Gonini Expedition. — 1 female.

Koelekoele Creek, branch of the Litani River, Marowijne basin, Toemoek-Hoemak Range; 24 July 1939; D. C. Geijskes. — 1 male, 1 female, 1 juvenile.

Fall in Waremapan Creek, branch of the Litani River, Toemoek-Hoemak Range; 30 July 1939; D. C. Geijskes. — 1 male.

Description. Rathbun, 1905, p. 291, fig. 83.

Vernacular name. The Suriname name of the species is "lontoebaka" (cf. Geijskes, 1954).

Remarks. The present species is distinctly smaller than either of the two preceding; the cb. of the present specimens varies between 7 and 41 mm, cl. between 5 and 24 mm (in the ovigerous females cb. is 28 and 29 mm, cl. 17 mm).

The front is directed downwards, not horizontal as in *P. denticulata*, it is also somewhat more convex. The upper margin of the front is distinct, it is rounded, rather irregularly pitted, and bears several indistinct tubercles. In some specimens the postfrontal lobes are distinct, in others they are obscure; a shallow median groove extends from the postfrontal lobes to the upper frontal margin. The orbits are short and entirely filled by the eyes. The cervical groove is straight. As a rule the carapace is rather flat. The antero-lateral margin reaches sometimes to the orbits, but in some specimens it stops just before reaching it.

The fingers of the chelipeds may show longitudinal rows of small pits or granules, but they are not grooved. The fingers are longer than the palm. In the large chela of the adult male the fingers are considerably gaping; this is far less distinct in the females and in the young males. The larger teeth on the cutting edges of the fingers are placed decidedly closer together in the proximal than in the distal part; in the distal part the larger teeth are sometimes separated from one another by small denticles. The walking legs are very slender.

The male abdomen is as figured by Rathbun. In some specimens the lateral margins of the telson are more or less concave.

The first pleopod of the male, as usual, is the most reliable character for the recognition of the species. The shape of this pleopod, as shown by the specimen from the Nassau Range (1948-1949 Suriname Expedition no. 7957) and figured here as textfig. 58a, b, is quite typical. It is shown by practically all the male specimens examined. In the juveniles the various details are not yet fully developed but the general shape is very distinct even there (see textfig. 58c). Some variations were found: in some specimens

the inner pointed lobe is more elongate and may have a more acute lower inner angle than figured here. Two of the males enumerated here, viz., the one from the Bakhuis Range and that from the Wilhelmina Range, differ rather strongly from the usual type (textfig. 58d, e). In these aberrant specimens the distal flap of the pleopod lacks the small tooth on the inner margin, while it is this inner and not the outer margin, which on the posterior surface is raised to a high carina; also in other respects there are differences in the two pleopod types as appears when comparing textfigs. 58a, b with textfigs. 58d, e. As the general structure of these two kinds of pleopod is the same, and as no additional characters can be found to distinguish males with these different types of pleopods, the specimens are provisionally treated here as belonging to a single species. If more material of males with the second type of pleopod will be forthcoming it may be possible to give a better documented opinion on this question. The male specimen from the Bakhuis Range differs from all other specimens in having the lateral margins of the telson very distinctly concave, but the male from the Wilhelmina Range does not differ in this respect from the normal males of *P. wymani*. The dactyli of the chelipeds in the male from the Bakhuis Range show a dark dorsal streak in the distal fourth of their length; this character is not shown by the male from the Wilhelmina Range.

Colour. In my specimens the carapace is olive, reddish, or yellowish brown, and as a rule it is not darker than the dorsal surface of the legs. The legs are sometimes of a marbled olive colour. The chelae are pale olive or yellowish brown, often the fingers are more reddish brown and with the distal part lighter than the proximal. In several specimens the tips of the fingers are dark grey or brown, while sometimes the teeth are of the same colour.

Type locality. Suriname.

Distribution. As far as is known to me, the species has not been reported from outside Suriname.

Occurrence in Suriname. *Pseudothelphusa wymani* inhabits small creeks and rivulets in the mountainous part of Suriname and in the extreme southern part of the coastal region. The first record of the species was that by Rathbun (1905) who based her description of the species on material collected in Suriname by Jeffries Wyman. The brown crabs mentioned by Geijskes (1942, p. 65; 1957, p. 242) are those listed above from the Koele-koele Creek. Geijskes (1954, p. 69) remarked "De kleine ronde kreekkrab, genoemd "lontoebaka" (*Pseudothelphusa geayi* Nobili), wordt weinig gegeten" (the small roundish creek crabs, named "lontoebaka" (*Pseudothelphusa geayi*) are not often eaten); it is probable that the present species is meant.

## Family Goneplacidae

**Speocarcinus carolinensis** Stimpson, 1859

## Coquette Investigations

Station 212, between the mouths of the Suriname and Marowijne Rivers, 6° 45' N 54° 30' W; bottom mud; depth 44 m; 14 June 1957. — 1 female. (W)

Description. Rathbun, 1918, p. 39, pl. 8, pl. 159 fig. 6.

Remarks. In the present specimen, a female with cb. 10 mm, the separation between the first and second antero-lateral teeth is hardly noticeable, so that the margin seems to have but four teeth.

Type locality. Charleston Harbor, South Carolina, U.S.A.

Distribution. East coast of America from South Carolina to Suriname and the West Indies. The Rijksmuseum van Natuurlijke Historie possesses a specimen from the Gulf of Paria near San Fernando, Trinidad (2 May 1952). *Speocarcinus carolinensis* has not been reported before from Suriname.

**Chasmocarcinus typicus** Rathbun, 1898

## Coquette Investigations

20 miles N. of the mouth of the Marowijne River; depth 27 m; 23-27 April 1957; fourth voyage. — 1 ovigerous female. (L)

Station 2, off the mouth of the Suriname River, 6° 23' N 55° 05.5' W; bottom mud; depth 27 m; 11 May 1957. — 1 male. (L)

Description. Rathbun, 1918, p. 55, textfigs. 23, 24.

Remarks. The carapace breadth of the ovigerous female is 9 mm, that of the male is 10 mm. The specimens agree with Rathbun's description. In the male the penultimate segment of the abdomen has the posterior margin somewhat elevated in the middle, forming there a kind of tubercle.

Type locality. North of Trinidad, 10° 37' 40"-10° 37' 00" N 61° 42' 40"-61° 44' 22" W; depth 31-34 fathoms.

Distribution. N. of Trinidad, and off Cabo Frio, Brazil. The species is now reported for the first time from Suriname. It was known from depths between 31 and 59 fathoms; this range has now become 15 to 59 fathoms.

## Family Grapsidae

**Goniopsis cruentata** (Latreille, 1802-1803) (textfigs. 59, 60)

? *Cancer marmoratus* Fermin, 1765, p. 73.

? *Cancer terrestris, minor* Fermin, 1769, vol. 2, p. 275; Fermin, 1770, p. 248.

? "Gemarmerde Krab" Hartsinck, 1770, p. 118.

*Cancer ruricola* De Geer, 1778, p. 417, pl. 25, 26 figs. 1-3 (not *Cancer ruricola* L., 1758).

"Duivelskrab" Teenstra, 1835, p. 443.

*Grapsus longipes* Randall, 1840, p. 125.

*Grapsus cruentatus* Gibbes, 1850, p. 181.

*Goniopsis cruentatus* Kingsley, 1880, p. 190; Young, 1900, p. 278.

#### Museum Leiden

Mouth of the Coppename River near Boskamp about 95 km W. of Paramaribo; muddy shore, among plants; 2 April 1957; L. B. Holthuis no. 1214. — 5 males, 3 females (1 ovigerous).

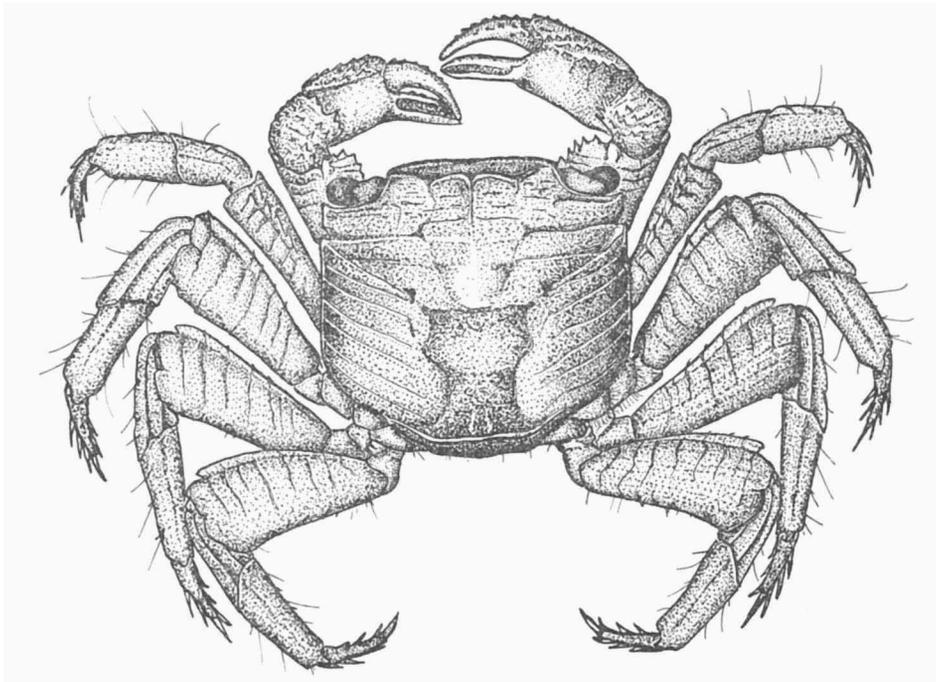


Fig. 59. *Goniopsis cruentata* (Latreille). Specimen from the bank of the Suriname River near Combé  $\times 0.9$ .

Shore of Suriname River near plantation "Purmerend", Leonsberg, N. of Paramaribo; in mangroves, close to the water's edge; 1 April 1957; L. B. Holthuis no. 1208. — 2 males, 1 female.

Combé, just N. of Paramaribo; 17 March 1939; H. W. C. Cossee. — 1 male.

Bank of Suriname River near Combé, N. of Paramaribo; 5 May 1942; D. C. Geijskes. — 1 female.

Paramaribo; 1911; W. C. van Heurn. — 1 male, 1 female.

Plantation "Lust en Rust", east bank of Suriname River near Paramaribo; 13 March 1939; H. W. C. Cossee. — 1 female.

Ditch near the Fisheries Service Station "Matappica", at Matappica Canal, N. of the Commewijne River, about 2 km from the sea shore; in holes in the sides of the ditch; 6 April 1957; L. B. Holthuis no. 1221. — 4 males, 2 females.

In parwa (= *Avicennia nitida* Jacq.) forest at the sea shore near Wiawia Bank; under pieces of wood washed ashore; 12 November 1948; 1948-1949 Suriname Expedition no. 2621. — 4 males, 4 females.

Galibi at west bank of the mouth of the Marowijne River; in small creek near coconut plantation; 9 November 1948; 1948-1949 Suriname Expedition nos. 2413 and 2513. — 3 males, 4 females.

Suriname; 1901 Coppename Expedition. — 1 male.

#### Museum Amsterdam

Paramaribo; don. Koloniaal Museum Haarlem. — 1 male, 1 female.

#### Museum Berlin

Suriname; H. B. Möscher. — 1 female.

#### Museum Philadelphia

Suriname; C. Hering. — 1 male, 1 female: syntypes of *Grapsus longipes* Randall (dry).

Description. Rathbun, 1918, p. 237, textfig. 136, pl. 57.

Vernacular names. In Suriname the present species is indicated with the Dutch names "duivelskrab" (devil's crab) or "rode duivelskrab" (red devil's crab). The former of these names, however, seems also to be in use for *Sesarma rectum* Randall and *Uca maracoani* (Latr.). In a letter of 1 April 1825 Dieperink indicated the present species as "Vierkante-krabbe" (= quadrangular crab), but since Teenstra (1835, p. 443) in the same period used the name "Duivelskrab", it seems likely that the latter name was in common use at that time and that the former may have been invented by Dieperink. The Suriname name of the species is "didibrie-kraboe" (= devil's crab).

Remarks. The carapace breadths of the specimens examined range between 19 and 51 mm; the ovigerous female has cb. 33 mm, the largest female cb. 45 mm.

A coloured figure of this crab was provided by Rathbun (1901, pl. 1 lower figure). The brightness of the various colours is subject to considerable variation, and the red of the legs and body may be much more showy than in the just mentioned illustration. In a letter of 27 August 1827 to Temminck, Dieperink wrote "deze Krappe is zeer zonderling heeft fraai roodgekleurde pooten welke zwart gespikkeld. Zijn onderlijf is de kleur geel" (this crab is very peculiar and has beautifully red coloured legs with black speckles. Its abdomen is of a yellow colour).

Type locality. "Les îles de l'Amérique méridionale".

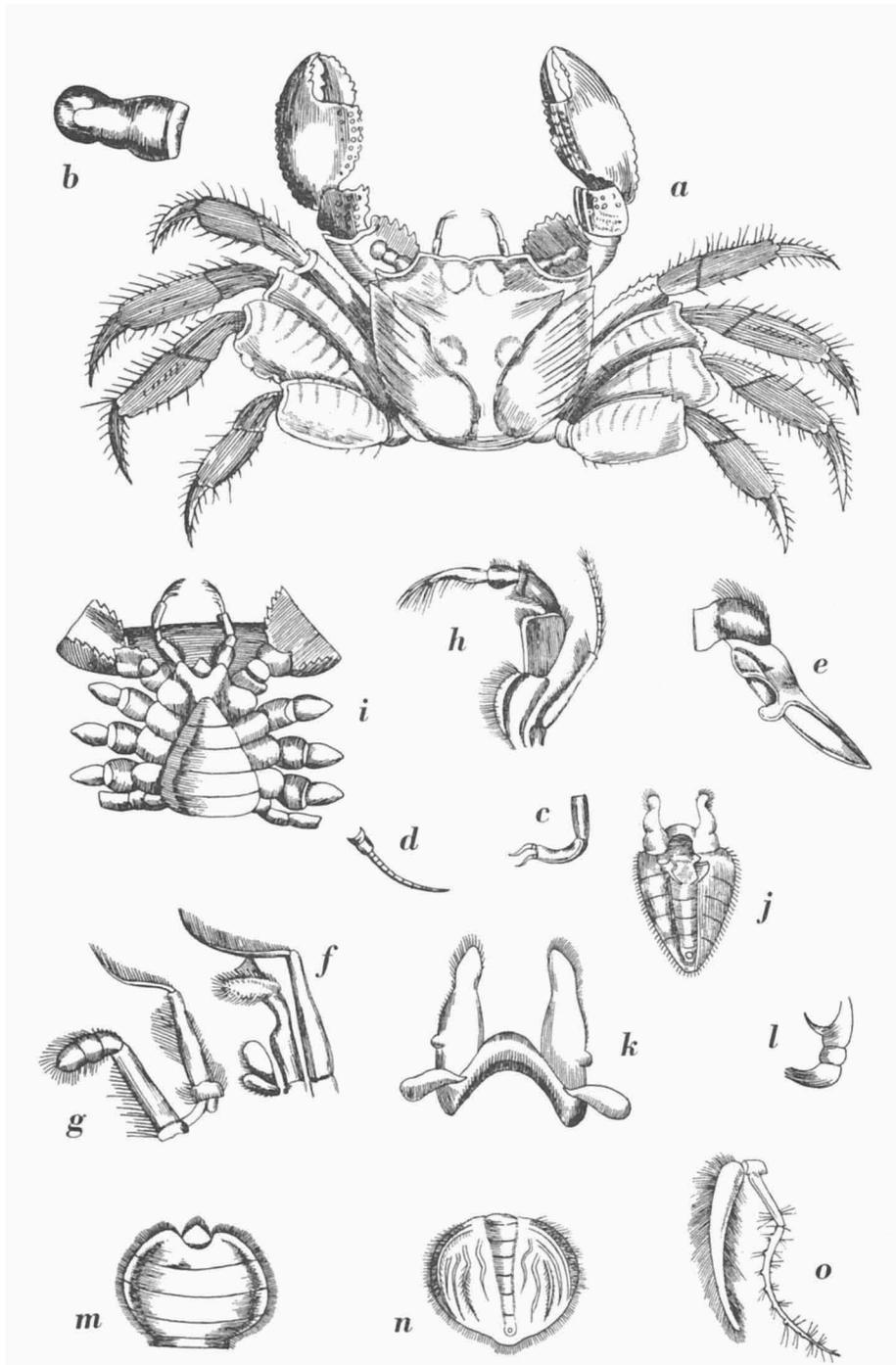


Fig. 60. *Goniopsis cruentata* (Latreille). a, animal in dorsal view; b, eye; c, antennula; d, antenna; e, mandible; f, first maxilliped; g, second maxilliped; h, third maxilliped; i, abdomen and sternum of male in ventral view; j, abdomen of male in dorsal view; k, first pleopods of male; l, second pleopod of male; m, abdomen of female in ventral view; n, abdomen of female in dorsal view; o, pleopod of female. After De Geer, 1778.

Distribution. East coast of America (Bermuda, the Bahamas and Florida to Brazil and the West Indies) and the west coast of Africa (Senegal to Angola).

Occurrence in Suriname. *Goniopsis cruentata* is one of the common crabs of the estuaries of the Suriname rivers and may be found in considerable numbers on the muddy banks of rivers and ditches where there is some vegetation; it is also frequently found in mangrove swamps. As Young (1900) remarked "they live more on the land than in the water", though they are always found in humid places close to the water's edge. Its often bright red coloration and striking colour pattern make this one of the most conspicuous crabs of the coastal area. Like most Grapsids *Goniopsis* is a fast runner and for that reason is hard to catch.

Probably the first Suriname record of this species is that by Fermin (1765) who speaks of "le Crabe marbré, dont la tête est lisse & parsemée de différentes couleurs, en Latin *Cancer Marmoratus*". This description is quite insufficient, but seems to fit best for the present species. Fermin's (1769 and 1770) *Cancer terrestris, minor* may also refer to the present species, though Fermin's description is practically literally copied from Labat's (1724, vol. 1 pt. 2, p. 47) account of the Tourlouroux from Martinique which is a species of *Gecarcinus*. Hartsinck's (1770) description of the "Gemarmerde Krab" is a mere translation of Fermin's (1765) account of *Cancer Marmoratus*. The first certain record of the species from Suriname is that by De Geer (1778), who gave an extensive description and good figures of a specimen "que M. Rolander m'a envoyés de Surinam". De Geer considered his specimen to belong to *Cancer ruricola* L., a quite different species, which at present is named *Gecarcinus ruricola* (L.), and which inhabits the West Indian Islands and Florida. De Geer's remark (p. 418) that the specimens "vivent sur terre & sur les montagnes, où ils se font des trous dans le sable pour s'y cacher" clearly refers to *Gecarcinus* and not to *Goniopsis*. Teenstra (1835) speaks of "de allersierlijkst geteekende duivelskrab" (the most elegantly ornated devil's crab), with which he evidently meant to indicate the present species. Randall (1840) described a new species of crab, *Grapsus longipes*, which was collected by C. Hering in Suriname; this proves to be identical with *Goniopsis cruentata*, as has already been pointed out by Gibbes (1850) and Kingsley (1880), both of whom examined Randall's type.

***Pachygrapsus gracilis*** (De Saussure, 1858) (pl. X fig. 3)

Museum Leiden

Mouth of Coppename River near Boskamp, about 95 km W. of Paramaribo; muddy

shore; 2 April 1957; L. B. Holthuis no. 1214. — 5 specimens (1 with a Sacculinid parasite).

Mouth of the Suriname River near Braamspunt; in holes of pieces of wood washed ashore on a muddy sand beach; 5 April 1957; L. B. Holthuis no. 1219. — 39 specimens (4 ovigerous).

Shore of the Suriname River near "Purmerend" plantation, Leonsberg, N. of Paramaribo; 1 April 1957; L. B. Holthuis no. 1208. — 1 male, 1 ovigerous female.

Ditch near the Fisheries Service Station "Matappica", at Matappica Canal, N. of the Commewijne River, about 2 km from the sea shore; 6 April 1957; L. B. Holthuis no. 1221. — 10 specimens (3 ovigerous).

Sea shore near the mouth of the Matappica Canal; among pieces of wood washed ashore on a muddy sand beach, and in holes of a tough clay bottom; 6 April 1957; L. B. Holthuis no. 1222. — 11 specimens (5 ovigerous).

Description. Rathbun, 1918, p. 249, pl. 60 fig. 3, pl. 61 fig. 1.

Remarks. The specimens agree with Rathbun's description of the species. The carapace breadths in my material vary between 5 and 19 mm, being 7 to 19 mm in ovigerous females. A character in which *P. gracilis* differs from *P. transversus* (Gibbes) is the lack of a large tuft of whitish hairs on the anterior (= inner) surface of the propodus of the second pereopod. This tuft is absent in all the specimens of *P. gracilis* seen by me and present in all specimens of *P. transversus*.

Rathbun (1918, p. 249) stated the colour of the present species to be pinkish. My specimens from Braamspunt, which were found in very dark pieces of drift wood, were in life of a very dark, almost black colour. The other specimens mentioned here were light to dark greyish brown. Preserved specimens, which have been in alcohol for little over a year and a half, still show the same colours. The upper surface of the body and the legs is closely beset with dark blackish brown chromatophores. The abdomen is paler and the chelae are more yellowish brown.

Type locality. St. Thomas, West Indies.

Distribution. From Bermuda, the Bahamas and Florida to northern Brazil and the West Indies.

Occurrence in Suriname. The species is now reported for the first time from Suriname. It was found on the beach in pieces of driftwood, in holes in a tough clay at the sea coast, and farther to the interior in a muddy habitat.

### **Planes minutus** (Linnaeus, 1758)

*Nautilograpsus minutus* Kingsley, 1880, p. 202; Young, 1900, p. 286.

Museum Philadelphia

Suriname; C. Hering. — 1 female (dry).

Description. Rathbun, 1918, p. 253, pl. 63; Chace, 1951, p. 81, figs. 1a, 2a, d, g, j, k, l, 3a-h, 4-8.

Remarks. The above cited specimen of the Philadelphia Museum, a damaged female, seems to be the only specimen of this species known from Suriname. This locality lies somewhat outside the general range of the species as shown by Chace (1951, fig. 8). The capture closest to Suriname is that of 20 specimens taken at  $11^{\circ} 05' N$   $50^{\circ} 01' W$ . It remains possible that Dr. Hering did not collect the specimens in Suriname, but somewhere on the Western Atlantic during his voyage from Suriname to Philadelphia.

Chace (1951) showed that there are two species of *Planes*, the one being confined to the Atlantic region, the other to the Indo-West Pacific. Linnaeus's (1758, p. 625) description of *Cancer minutus* was probably based on both forms. His indication "*It. wgoth. 137. t. 3. f. 1*" refers to his 1747 *Cancer cantonensis*, while the specimens dealt with by Sloane, Kalm, and Osbeck belong to the Atlantic species. In order to definitely settle the identity of Linnaeus's species, I select here the specimen figured by Sloane (1725, p. 270, pl. 245 fig. 1) as the lectotype of *Cancer minutus* Linnaeus, 1758. This action definitely links the specific name *minutus* to the Atlantic species.

Type locality. "*Habitat in Pelagi Fuco natante*" (Linnaeus, 1758, p. 628). By the above lectotype selection the type locality is restricted to "on the *Sargasso* and other Submarine Sea-Plants, on the Northside of *Jamaica*" (Sloane, 1725, p. 270).

Distribution. Northern Atlantic Ocean south of the line connecting Newfoundland with the south coast of England and the southern North Sea. The few records from the S. Atlantic and Kerguelen need confirmation.

**Aratus pisonii** (H. Milne Edwards, 1837) (pl. XI fig. 1)

? "Crabe appellé soldat" Fermin, 1765, p. 73.

? "Krab Soldaat" Hartsinck, 1770, p. 118.

Museum Leiden

2.7 to 3 km N. of the highway between Coronie and Paramaribo at 21.6 km E. of Coronie; 21 December 1948; 1948-1949 Suriname Expedition no. 4417. — 1 female.

Shore of Suriname River near plantation "Purmerend", Leonsberg, N. of Paramaribo; mangroves; 1 April 1957; L. B. Holthuis no. 1208. — 1 male, 1 ovigerous female.

Combé, N. of Paramaribo; 17 March 1939; H. W. C. Cossee. — 1 male, 2 females. Agricultural Experiment Garden, Paramaribo; in trench; 10 February 1939; D. C. Geijskes. — 1 female.

Paramaribo; 1911; W. C. van Heurn. — 1 male.

Commewijne River; 24 August 1911; W. C. van Heurn. — 1 male.

Matappica Creek, branch of the Commewijne River, near Alliance; on piling of a small pier; 6 April 1957; L. B. Holthuis no. 1220. — 2 females.

Ditch near Fisheries Service Station "Matappica" at the Matappica Canal; on the woodwork of a small sluice; 6 April 1957; L. B. Holthuis no. 1221. — 3 males, 4 females (1 ovigerous).

Northcoast of Suriname just W. of the mouth of the Matappica Canal; 6 April 1957; L. B. Holthuis no. 1222. — 1 female.

Marowijne River near Albina; muddy creeks with slightly brackish water; 7 September 1939; D. C. Geijskes. — 1 ovigerous female.

Description. Rathbun, 1918, p. 323, pl. 96.

Remarks. The carapace breadth of the present specimens varies between 13 and 21 mm, in the ovigerous females between 16 and 21 mm. The ovigerous females were found in the months of April and September.

Type locality. Antilles.

Distribution. East coast of America from the Bahamas and Florida to Brazil and the West Indies; west coast of America from Nicaragua to Peru. Graham's (1955, p. 36, pl. 4 fig. 9) Shield-back Crab from British Guiana belongs to the present species.

Occurrence in Suriname. The species lives in mangrove swamps and on the shores of estuarine waters. It may often be seen walking out of the water on branches of mangrove trees or on wooden pilings of the waterfront. Fermin (1765) mentioned "le Crabe appellé soldat" as inhabiting Suriname. Possibly he took this name from Barrière (1741, p. 184), who in his description of the natural history of French Guiana dealt with: "Cancer lutarius, quadratus. *Cancellus marinus, minimus, quadratus*. Sloan. *Hist. Nat. Jam. Cancer terrestris, quadratae figurae Marcg. Crabe appellé Soldat*". Sloane's species is *Planes minutus* (L.), the one described by Marcgraf is *Aratus pisonii*. Barrère's species, therefore, may have been *Aratus*, though it remains possible that he had a species of *Sesarma*, or even a mixture of several species before him. It is impossible to find out which species was actually meant by Barrère, and this is still more true for Fermin's material. According to Dieperink, in the MS. list accompanying the material which he sent to Leiden in 1827 the name "Soldaatje" is used in Suriname to indicate species of *Uca*. Hartsinck (1770) only translated Fermin's sentence concerning "le crabe appellé soldat". Therefore no certain Suriname records of this species have until now been published.

### ***Sesarma (Sesarma) curacaoense*** De Man, 1892 (pl. XI fig. 2)

#### Museum Leiden

Muddy shore of a ditch near Boskamp, near the mouth of the Coppename River, about 95 km W. of Paramaribo; 2 April 1957; L. B. Holthuis no. 1213. — 1 male, 1 female.

Muddy shore of the Coppename River near its mouth near Boskamp; 2 April 1957; L. B. Holthuis no. 1214. — 3 males, 3 females.

Shore of the Suriname River near plantation "Purmerend", Leonsberg, N. of Paramaribo; 1 April 1957; L. B. Holthuis no. 1208. — 1 male, 1 female.

Ditch near Fishery Service Station "Matappica" near Matappica Canal; muddy bottom; 6 April 1957; L. B. Holthuis no 1221. — 1 male.

Description. Rathbun, 1918, p. 293, textfig. 147, pl. 78 figs. 1, 2, pl. 160 fig. 3.

Remarks. The present species belongs to the smaller Suriname representatives of the genus. In the material examined, the cb. of the males ranges between 13 and 19 mm, that of the females between 8 and 16 mm.

*S. curacaoense* is to be distinguished from the other species of *Sesarma* treated here by having a distinct tooth on the lateral margin of the carapace behind the outer orbital tooth. The dactyli of the chelipeds are not broadened, neither in the male nor in the female. The upper margin of these dactyli bears 6 or 7 horny tipped tubercles in their proximal half. The upper surface of the palm bears a distinct and sharp, bifurcated carina. The meri of the walking legs are far less broad than those of *S. rectum* or *S. benedicti*, but are wider than those of *S. ricordi*. The upper part of the propodi and carpi of all walking legs shows a dense cover of short dark hairs, between which there are scattered long bristles. Several narrow longitudinal strips of this velvety pubescence are visible on the dactyli.

Type locality. Curaçao.

Distribution. Cuba, Jamaica, Porto Rico, Curaçao, Suriname, Brazil. The species is now for the first time reported from Suriname, where, as shown by our material, it proves to be far from rare.

Occurrence in Suriname. The species was found on exposed muddy banks of large rivers, in small ditches, and among mangroves.

***Sesarma (Holometopus) rectum*** Randall, 1840 (textfig. 61; pl. XI fig. 4)

*Grapsus (Pachysoma)* aff. *haematocheir* De Haan, 1835, p. 62.

*Sesarma recta* Randall, 1840, p. 123; Kingsley, 1880, p. 217; Ortmann, 1897, p. 331, pl. 17 fig. 8; Tesch, 1914a, p. 249.

*Sesarma (Holometopus) recta* Tesch, 1917, p. 190.

*Sesarma (Holometopus) rectum* Rathbun, 1918, p. 298.

#### Coquette Investigations

Station 28, N.E. of the mouth of the Suriname River, 6° 48' N 54° 54' W; bottom shells; depth 46 m; 12 May 1957. — 1 female. (W)

#### Museum Leiden

Coronie Polder near Coronie; shore of the canal leading to the sea; mud; 11 April 1957; L. B. Holthuis no. 1242. — 1 male.

2.6 to 2.7 km N. of the highway from Coronie to Paramaribo at 21.6 km E. of Coronie; 21 December 1948; 1948-1949 Suriname Expedition no. 4418. — 1 male.

Muddy shore of a ditch near the mouth of the Coppename River near Boskamp, about 95 km W. of Paramaribo; 2 April 1957; L. B. Holthuis no. 1213. — 8 males, 15 females.

Muddy shore of the mouth of the Coppename River near Boskamp; 2 April 1957; L. B. Holthuis no. 1214. — 12 males, 5 females (1 ovigerous).

Shore of the Saramacca River near Carl François, about 80 km W. of Paramaribo; among driftwood; 2 April 1957; L. B. Holthuis no. 1210. — 2 females.

Saramacca River near Groningen; September 1911; W. C. van Heurn. — 1 male.

Between "Suriname Rivier" lightvessel and the coast; trawled; 27 July 1953; D. C. Geijskes. — 1 male.

Shore of Suriname River near plantation "Purmerend", Leonsberg, N. of Paramaribo; mangroves; 1 April 1957; L. B. Holthuis no. 1208. — 5 males, 3 females.

Near ferry, Leonsberg, N of Paramaribo; 8, 10, and 28 December 1939; D. C. Geijskes. — 14 males, 14 females (4 ovigerous).

Shore of the Suriname River between Leonsberg and Paramaribo; muddy shore, 19 October 1939; D. C. Geijskes. — 5 males, 13 females.

Shore of Suriname River near plantation "Morgenstond", N. of Paramaribo; 15 December 1939; D. C. Geijskes. — 2 males, 3 females.

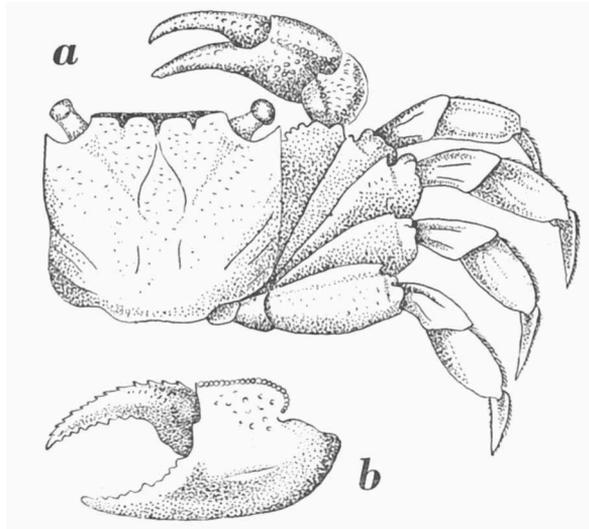


Fig. 61. *Sesarma rectum* Randall. a, holotype in dorsal view; b, left cheliped of holotype in lateral view. a, b, natural size. After Ortmann, 1897.

Combé, N. of Paramaribo; 17 March 1939; H. W. C. Cossee. — 2 males.

Sommelsdijkse Creek near Agricultural Experiment Garden, Paramaribo; 21 October 1939; D. C. Geijskes. — 3 males, 3 females.

Saramacca Canal near Lelydorpweg, Paramaribo; 16 December 1939; D. C. Geijskes. — 1 male, 1 female.

Suriname River near Paramaribo; brackish water; 1907; M. D. Horst. — 1 male.

Paramaribo; July 1911; W. C. van Heurn. — 3 males, 4 females.

Paramaribo; 1911; W. C. van Heurn. — 3 males (1 dry).

Paramaribo; 17 March 1939; H. W. C. Cossee. — 3 males, 5 females.

Shore of the Para River near its confluence with the Suriname River, between Paramaribo and Domburg; muddy shore; 31 March 1957; L. B. Holthuis no. 1202. — 2 males, 2 females.

Domburg, S. of Paramaribo; under pieces of wood in a small creek emptying in

the Suriname River; muddy bottom; 31 March 1957; L. B. Holthuis no. 1204. — 4 males, 3 females.

Suriname River near plantation "La Resource" near Domburg; 19 December 1939; D. C. Geijskes. — 3 males, 3 females.

Eastern shore of the Suriname River near plantation "Lust en Rust"; 13 March 1939; H. W. C. Cossee. — 2 males, 3 females.

Galibi on the Marowijne River; small creek near plantation; 9 November 1948; 1948-1949 Suriname Expedition no. 2514. — 1 male, 1 female.

Suriname; D. C. Geijskes. — 1 female.

#### Museum Amsterdam

Suriname. — 1 male, 1 female.

#### Museum Hamburg

Paramaribo; brackish water, in mud; J. Michaelis, received 31 January 1899; C. Heller, received 4 August 1908. — 11 males, 9 females.

#### Museum Philadelphia

Suriname; C. Hering. — 1 male (holotype).

#### Museum London

Suriname; W. Gillespie. — 4 males, 2 females (1 ovigerous).

Description. Rathbun, 1918, p. 298, pl. 82.

Vernacular names. According to a label accompanying Van Heurn's material from Paramaribo (July 1911) the species is named "duivelskrab" (devil's crab) in Suriname. If this information is correct, the species shares this name with *Goniopsis cruentata*. Graham (1955, p. 34, pl. 5 figs. 2, 3) reported this species from British Guiana under the name "Square-backed Land Crab".

Remarks. The carapace breadths of the specimens examined vary between 13 and 33 mm, in the ovigerous females between 18 and 30 mm. The latter were collected in the months of April and December.

As shown by the above measurements *S. rectum* attains a much larger size than any of the other species of the present genus dealt with in this paper. Furthermore it differs from *S. curacaoense*, but agrees with the other species, in having no distinct tooth on the lateral margin of the carapace behind the outer orbital tooth. The chelipeds are characterized by the presence of a single sharp carina on the dorsal margin of the palm. The dactyli of the chelae are not broadened at the base in either sex; the upper margin bears a row of more than 10 tubercles. The walking legs have the meri strongly broadened, in adult specimens they are more than half as broad as long. The propodi and sometimes the extreme distal part of the carpi, apart from a few long bristles, bear a field of numerous densely

placed short hairs on the upper margin; five narrow longitudinal strips of such hairs are present on the dactyli.

Colour. The legs and the larger part of the carapace are of a dull greyish purple tinge. The anterior part of the cephalothorax and the chelipeds are yellow.

Type locality. Suriname.

Distribution. The species is known from Trinidad, Tobago, British and Dutch Guiana, and Brazil (S. to São Paulo). In the collection of the Leiden Museum there are three males and two females from Lambeau River near the sea coast, Tobago, British West Indies (15 January 1955, P. W. Hummelinck no. 656A).

Occurrence in Suriname. The species is quite common in the estuaries of the Suriname rivers. It digs holes in the muddy banks of the rivers and ditches. According to Graham (1955, p. 34) in British Guiana they "are very common on waste ground just above high water mark, especially in the winter season, when they breed. At very high spring tides they climb on to grass stems and other vegetation out of reach of the waves".

The first mention of this species from Suriname is that by De Haan (1835, p. 62), who in his description of the Japanese *Grapsus* (*Pachysoma*) *haematocheir* (= *Sesarma haematocheir* (De Haan)) remarked: "Clar. Dieperink e Paramaribo misit speciem affinem lateribus integris, manibus latere exteriore laevibus; in qua vero thorax fasciculatus parte antica, manus flavae margine supremo acutae granulatae, carpi quadrati granulati, frons profunde sinuata, femora valde dilatata". Dieperink's specimens are no longer extant, but their identity is perfectly clear from De Haan's short but excellent description. De Haan did not give a name to the species. Randall (1840), who described a male collected by C. Hering in Suriname, was the first author to provide the species with a valid name. Randall's type is still preserved in the Philadelphia Museum. Kingsley (1880) mentioned this type, while Ortmann (1897) gave an additional description and a figure of it. Tesch (1914a) casually mentioned the occurrence of the species in Suriname; in his 1917 paper the same author dealt with material from Paramaribo preserved in the Leiden Museum (leg. M. D. Horst and W. C. van Heurn). Rathbun (1918) gave an excellent description and illustration of the species, of which she had examined the type.

***Sesarma* (*Holometopus*) *ricordi*** H. Milne Edwards, 1853 (pl. XI fig. 3)

Museum Leiden

Muddy shore of Coppename River near Boskamp, 95 km W. of Paramaribo; 2 April 1957; L. B. Holthuis no. 1214. — 1 female.

Eastern shore of the mouth of the Suriname River near Braampunt; 5 April 1957; L. B. Holthuis no. 1219. — 1 male.

North coast of Suriname just W. of the mouth of the Matappica Canal; 6 April 1957; L. B. Holthuis no. 1222. — 8 males, 3 females.

#### Museum Amsterdam

Suriname; don. Koloniaal Instituut. — 1 female.

Description. Rathbun, 1918, p. 308, pl. 89.

Remarks. The carapace breadths of the above specimens range from 12 to 23 mm. The present species resembles *S. rectum* and *S. benedicti* in having no teeth on the lateral margin of the carapace behind the external orbital tooth. It may at once be distinguished, however, by the slender legs. In the males the legs are more slender than in the females, while in the larger specimens they are more slender than in the smaller. In the small female no. 1214, the meri of the fourth pereiopods are only 2.6 times as long as wide; in the next larger female this ratio is 2.7, while in fully adult specimens the merus is three times as long as broad. The chelae of the male have the fingers normal, they are not excessively broadened at the base. The palm does not show a dorsal carina. The upper surface of the postfrontal lobes is practically smooth, though it may bear short hairs which are uniformly arranged and not in transverse or oblique rows or in tufts. The pubescence of the legs resembles that of *S. benedicti* and differs from that of *S. rectum*. Conspicuous dark tufts of hairs are visible on the sternal surface between the bases of the second and third and between those of the third and fourth pereiopods.

Type locality. Haiti.

Distribution. From Bermuda, the Bahama Islands and S. Florida to Brazil and the West Indies.

Occurrence in Suriname. The species is now reported for the first time from Suriname. Most specimens were collected there on the beach of the Atlantic Ocean among pieces of driftwood (usually dead trees); one was found on the muddy bank of the Coppename River. The specimens from near the mouth of the Matappica Canal were collected in the evening and were noted to be extremely agile and hard to catch; they were found there in great numbers. The name "Beach Crab" given by Rathbun (1918) to this species is very appropriate for the Suriname specimens: the present species being the only representative of the genus *Sesarma* found there on the beach.

Tesch (1914a, p. 249) stated: "*S.[esarma] cinerea, chiragra en recta* zijn in Suriname waargenomen." (*S. cinerea, chiragra, and recta* have been observed in Suriname). It seems likely that the name *S. cinerea* got in here by

mistake, since in Tesch's (1917) revision of the genus *Sesarma* he does not mention any Suriname material or record for this or any related species.

***Sesarma (Holometopus) benedicti* Rathbun, 1897 (textfig. 62)**

*Sesarma recta* De Man, 1892, p. 249, pl. 10 fig. 4. (not *Sesarma recta* Randall, 1840)

*Sesarma benedicti* Rathbun, 26 April 1897, p. 90; Ortmann, 20 July 1897, p. 371.

*Sesarma chiragra* Ortmann, 20 July 1897, p. 331; Tesch, 1914a, p. 249.

*Sesarma (Holometopus) benedicti* Tesch, 1917, p. 132; Rathbun, 1918, p. 316, pl. 93.

Museum Leiden

Muddy shore of a ditch near the mouth of the Coppename River near Boskamp, about 95 km W. of Paramaribo; 2 April 1957; L. B. Holthuis no. 1213. — 1 female.

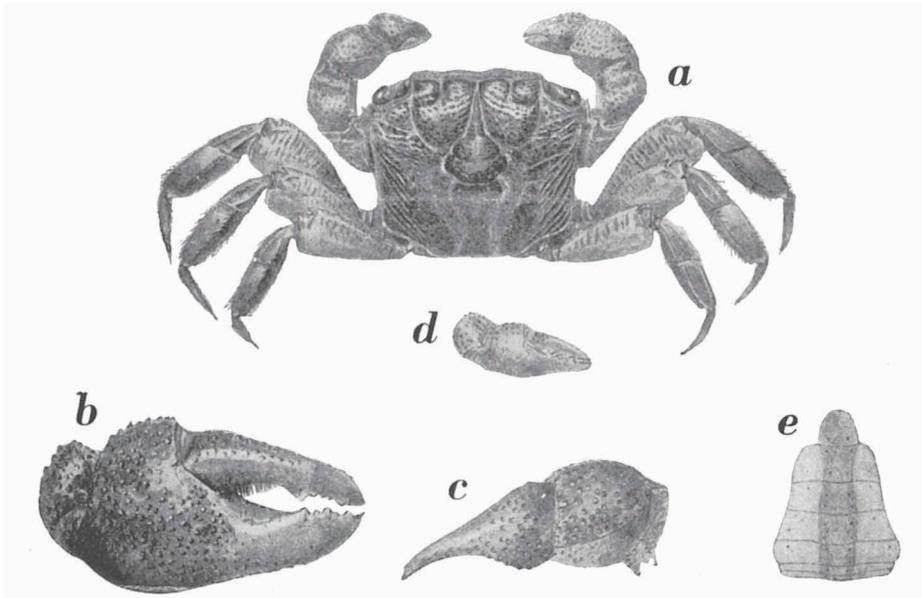


Fig. 62. *Sesarma benedicti* Rathbun. a, male syntype in dorsal view; b, chela of male syntype in lateral view; c, chela of male syntype in dorsal view; d, chela of female syntype in lateral view; e, abdomen of male syntype. a,  $\times 1.5$ ; b, c,  $\times 3$ ; d, e,  $\times 2$ . After De Man, 1892.

Shore of Saramacca River near Carl François, about 80 km W. of Paramaribo; among driftwood; 2 April 1957; L. B. Holthuis no. 1210. — 15 males, 9 females (1 ovigerous).

Paramaribo; 1911; W. C. van Heurn. — 1 male.

Suriname River near Paramaribo; 1907; M. D. Horst. — 1 male.

Shore of the Para River near its confluence with the Suriname River, between Paramaribo and Domburg; muddy shore; 31 March 1957; L. B. Holthuis no. 1202. — 6 males, 7 females.

Domburg, S. of Paramaribo; under pieces of wood in a small creek emptying in the

Suriname River; muddy bottom; 31 March 1957; L. B. Holthuis no. 1204. — 5 males, 1 female.

Suriname River near plantation "Thorarica", S. of Domburg; in swamp creek; 6 February 1957; D. C. Geijskes. — 6 males, 9 females.

Mouth of Marowijne River near Christiaankondre; August 1957; A. C. J. Burgers. — 17 males, 8 females (2 ovigerous).

Albina on the Marowijne River; 25 July 1911; W. C. van Heurn. — 1 male.

Marowijne River near Albina; in muddy creeks with slightly brackish water; 7 September 1939; D. C. Geijskes. — 16 males, 11 females.

Shore of Marowijne River near Albina; among pieces of wood; 1 November 1948; 1948-1949 Suriname Expedition no. 2402. — 3 males, 4 females.

Marowijne River near Zwampoekondre; among stones on the river shore; 7 February 1949; 1948-1949 Suriname Expedition no. 6393. — 2 males, 2 females.

Pakira Creek near Bigibajakondre on the Marowijne River; 8 February 1949; 1948-1949 Suriname Expedition no. 6394. — 12 males, 2 females.

Marowijne River near the mouth of the Pakira Creek; 8 February 1949; 1948-1949 Suriname Expedition no. 6395. — 1 male.

Eastern shore of the Marowijne River, opposite the base camp at 4° 47' N; 17 February 1949; 1948-1949 Suriname Expedition no. 6925. — 1 female.

Suriname; H. F. C. ten Kate. — 3 males, 3 females (2 ovigerous) (lecto- and paratypes of *Sesarma benedicti* Rathbun and of *S. chiragra* Ortmann).

#### Museum Amsterdam

Suriname; H. F. C. ten Kate; coll. J. G. de Man. — 1 male, 1 female (paratypes).

#### Museum Berlin

Paramaribo; received August 1908; C. Heller. — 1 male (in spirit), 1 female (dry).

Upper Commewijne River; February 1908; C. Heller. — 5 males, 2 females (1 ovigerous).

#### Museum Hamburg

Paramaribo; brackish water, in mud; J. Michaelis, received 31 January 1899; C. Heller, received 4 August 1908. — 2 males, 1 female.

Paramaribo; 1908; C. Heller. — 7 males, 4 females.

Description. Rathbun, 1918, p. 316, pl. 93.

Remarks. The present species never attains the size of full grown specimens of *S. rectum*, with which it agrees in the absence of a tooth on the lateral margin of the carapace behind the outer orbital tooth. The carapace breadths of the above specimens range between 7 and 22 mm, in the ovigerous females between 13 and 20 mm. The males of *Sesarma benedicti* may be immediately distinguished from those of related species by the conspicuous broadening of the basal part of the dactylus of the chelipeds, while the palm of the male chelae usually has a bluish or purplish colour. Both males and females differ from specimens of *S. rectum* by having the dorsal margin of the palm of the chela not provided with a single sharp longitudinal carina,

but with either scattered tubercles or with a few very short oblique rows of tubercles. In *S. benedicti* the meri of the walking legs are rather broad, but less wide than in *S. rectum*. The propodi do not show the dense short pubescence found in *S. rectum*, in the present species the dorsal part of the propodi bears only several longer or shorter bristles. The dactyli do not show any short velvety pubescence either, they only bear longitudinal rows of bristles.

The species was reported upon for the first time by De Man (1892) who gave an excellent description and good figures of the above mentioned Suriname material collected by Dr. H. F. C. ten Kate. With some doubt De Man referred this material to *Sesarma rectum* Randall. In 1897 two authors (Mary J. Rathbun and A. E. Ortmann) independently arrived at the conclusion that De Man's material does not belong in Randall's species and both proposed a new name for the species described by De Man. Rathbun suggested the name *Sesarma benedicti*, Ortmann that of *S. chiragra*. As Rathbun's paper was published on 26 April 1897 and that by Ortmann on 20 July 1897, Rathbun's name *benedicti* has priority, a fact which was recognised by Ortmann in an addendum (p. 371) to his paper. The material collected by Dr. ten Kate and described as *S. rectum* by De Man thus is the type material of both *S. benedicti* and *S. chiragra*. From this material I have now selected the largest male specimen (cb. 20 mm) to serve as the lectotype for both *Sesarma benedicti* Rathbun and *S. chiragra* Ortmann, which thereby become objectively synonymous.

Type locality. Suriname.

Distribution. The species is known from Key West, British and Dutch Guiana, and from the coast of Brazil south to Rio de Janeiro.

Occurrence in Suriname. The species is common on the banks of the various Suriname rivers in brackish or almost fresh water. It has often been found under wood or stones on the river banks. De Man (1892) was the first to report the species from Suriname, basing himself on the material collected by H. F. C. ten Kate. Tesch (1917) listed the Suriname material of this species collected by Ten Kate, Horst and Van Heurn preserved in the Leiden Museum.

#### Family Gecarcinidae

#### **Ucides cordatus** (Linnaeus, 1763) (textfig. 63)

"Lant-krabben" Keye, 1659, p. 73; Keye, 1667, p. 73.

"Landt-krabben" Anonymous, 1676, p. 39.

*Cancer cordatus* Linnaeus, 1763, p. 414; Linnaeus, 1767, p. 1039; Fabricius, 1775, p. 400; Stadius Müller, 1775, p. 1099, pl. 34 fig. 1; Herbst, 1783, p. 131, pl. 6 fig. 38; Olivier, 1791, p. 151; Fabricius, 1793, p. 439; Collin, 1822, p. 8; Holthuis, 1958a, p. 84.

- Cancer Cordatus* Houttuyn, 1769, p. 316, pl. 104 fig. 1; Merian, 1771, vol. 2, p. 50.  
 "Crabe jaune" Fermin, 1765, p. 73.  
 "A species of large Land Crabs" Bancroft, 1769, p. 202.  
*Cancer ruricola* Bancroft, 1769a, p. 123 (not *Cancer ruricola* L.).  
 ?*Cancer violaceus* Fermin, 1769, vol. 2, p. 276; Fermin, 1770, vol. 2, p. 249.  
 "Geele Krab" Hartsinck, 1770, p. 118.  
*Cancer Ruricola* Bancroft, 1782, p. 160.  
*Ocypode cordata* Latreille, 1802-1803b, p. 37.  
 "Spinnekrabben" Kunitz, 1805, p. 198.  
 "Land Crab" Von Sack, 1810, p. 274.  
 "Landkrebs" Von Sack, 1821, vol. 1, p. 230.  
 "Land-kreeft" Von Sack, 1821a, vol. 2, p. 247.  
 "Blaauwe krab met geelachtige schaduwen" Teenstra, 1835, p. 443.  
*Uca una* Kappler, 1881, p. 142; Kappler, 1887, p. 200; Ortmann, 1894, p. 733; Thompson, 1901, p. 4.  
*Uca laevis* Kappler, 1881, p. 143; Kappler, 1887, p. 201.  
*Uca cordata* Young, 1900, p. 250.  
*Gecarcinus ruricola* Penard, 1908, p. 401.  
*Ucides cordatus* Tesch, 1914a, pp. 248, 250.

#### Museum Leiden

- Cocos Polder near Coronie; just outside the sea dike; in holes in mud bottom; 11 April 1957; L. B. Holthuis no. 1239. — 5 males.  
 Muddy shore of a ditch near the mouth of the Coppename River near Boskamp, about 95 km W. of Paramaribo; 2 April 1957; L. B. Holthuis no. 1213. — 1 male, 1 female.  
 Muddy shore of the Coppename River near its mouth, Boskamp; 2 April 1957; L. B. Holthuis no. 1214. — 8 males, 6 females.  
 Bank of Suriname River near plantation "Purmerend", Leonsberg, N. of Paramaribo; in holes of muddy bottom in mangroves; 1 April 1957; L. B. Holthuis no. 1208. — 3 males, 3 females.  
 Leonsberg, near ferry, N. of Paramaribo; 10 December 1939; D. C. Geijskes. — 1 female.  
 In big trench of "Morgenstond" plantation, Leonsbergse weg, N. of Paramaribo; 19 October 1939; D. C. Geijskes. — 1 male.  
 Combé, N. of Paramaribo; 17 March 1939; H. W. C. Cossee. — 1 female.  
 Sommelsdijkse Creek, Agricultural Experiment Garden, Paramaribo; 21 October 1939; D. C. Geijskes. — 1 female.  
 Suriname River near plantation "La Resource"; 19 December 1939; D. C. Geijskes. — 1 male, 1 female.  
 Plantation "Lust en Rust", eastern shore of Suriname River, N.E. of Paramaribo; 13 March 1939; H. W. C. Cossee. — 3 males.  
 In mud of parwa (= *Avicennia nitida* Jacq.) forest, sea coast near the Wiawia bank; 12 November 1948; 1948-1949 Suriname Expedition no. 2623. — 1 male.  
 Small creek in plantation near Galibi on the Marowijne River; 9 November 1948; 1948-1949 Suriname Expedition nos. 2515 and 3413. — 6 males, 3 females.  
 Suriname; C. F. Kraepelin & H. Holm. — 2 males.  
 Suriname; 1891; H. F. C. ten Kate. — 1 male, 1 female.  
 Suriname; 1910; D. G. J. Bolten. — 1 male.

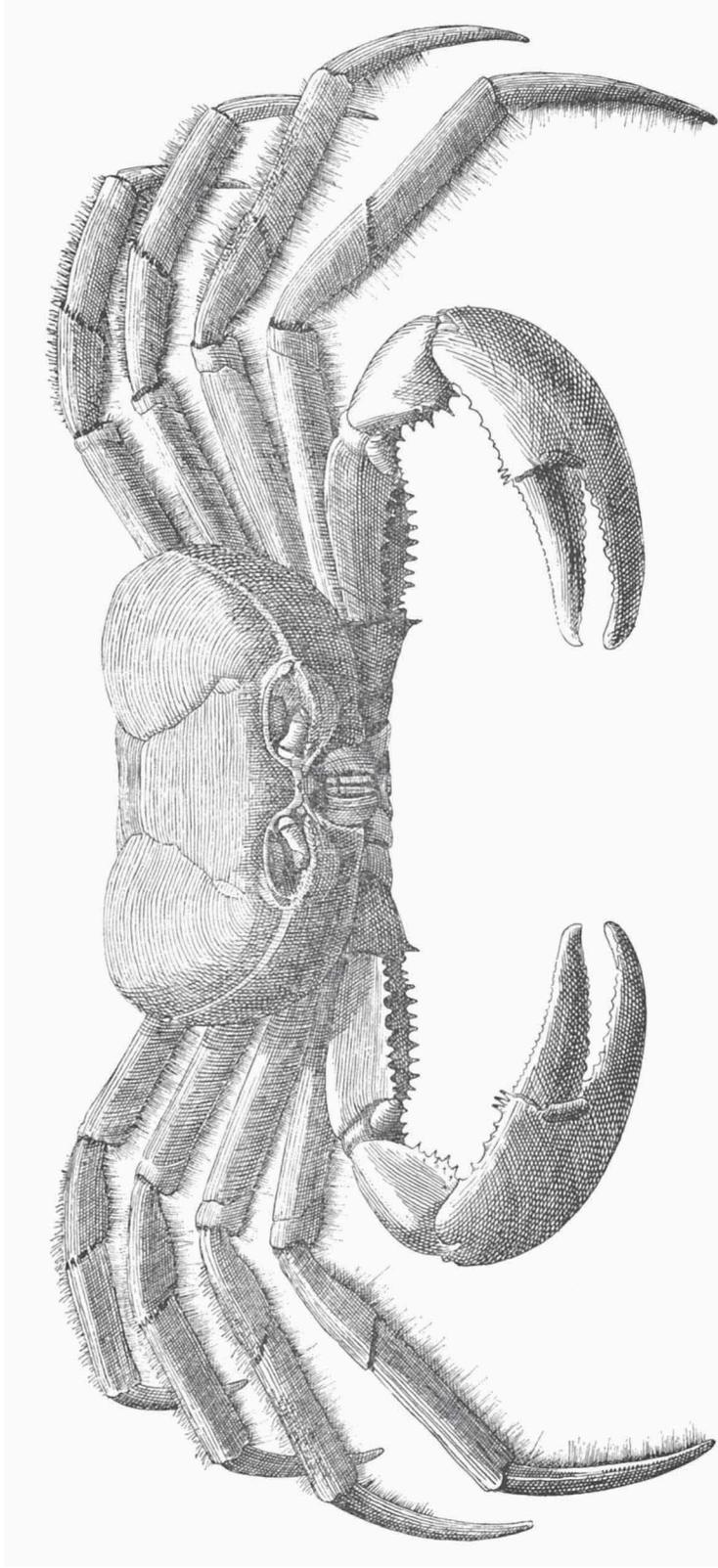


Fig. 63. *Ucidetes cordatus* (L.). Male specimen. After Houttuyn, 1769.

## Museum Philadelphia

Suriname; C. Hering. — 1 male.

## Museum Hamburg

Mouth of the Suriname River; 4 August 1908; C. Heller. — 3 males.  
Paramaribo; 1909; C. Heller. — 2 males.

Description. Rathbun, 1918, p. 347, textfig. 158, pls. 110-113, 159 figs. 3, 4.

Vernacular names. In the Suriname language the species is generally indicated as "kraboe". According to Kappler (1881, 1887) the Caribs of Suriname use the name "waiamu" for the females and "kusa" for the males; the Arowac name for the latter being "kwa". In British Guiana the species is indicated with the names "Buck crab" or "common crab" (Young, 1900, p. 250; Graham, 1955, p. 30).

Remarks. The carapace breadths of the present specimens range from 27 to 92 mm.

Colour. The colour of the carapace is usually bluish with some yellowish areas, while the legs are pinkish. The hairs on the legs are dark brown or almost black. Coloured figures of both the male and the female have been published by Young (1900, pls. 1, 7), who indicated them with the names *Uca cordata* and *Uca una* respectively.

Type locality. Suriname.

Distribution. West Indies (Cuba, Jamaica, Puerto Rico, St. Thomas), Atlantic coast of S. America from Panama to S. E. Brazil.

Occurrence in Suriname. The species is very common in the coastal area of Suriname where it lives not far from the sea in holes which it digs in the mud. Sometimes these holes are situated in exposed places, sometimes they are found under mangrove vegetation. The burrows are directed about vertically and are up to about 70 cm deep; they are as wide as a man's arm. The crabs enter their holes sideways, folding their chelipeds in front of the body. At certain times of the year the crabs seem to leave their burrows in huge numbers and then are caught by the natives (see below under Economic Importance). The published information concerning this so-called "crab-carnival" is rather scarce. Kappler (1881, p. 143) gave the following account: "Im Monat August ist der Krabbentanz oder ihr Karneval, wo verschiedene Arten dieser sonderbaren Geschöpfe wie närrisch auf dem Ufer umherlaufen, sich verfolgen und einander die Scheeren abzukneipen suchen. Vermuthlich ist dies ihre Begattungszeit. Auf diesen Karneval folgt die Fastenzeit, denn sie ziehen sich gleich nachher in ihre Löcher zurück, wo sie ihre Schalen abwerfen, und erst, wenn die neuen erhärtet sind, wieder ans Tageslicht kommen." Kappler's (1887, p. 201) account is practically

identical; he only adds that the burrows are closed when the crabs retire in them after the "carnival". Van Capelle (1926, p. 405) stated: "In Juli en September zamelen de I.[ndianen] massa's kr.[abben] in, om ze als voedsel te gebruiken. In deze maanden houden de dieren hun "carnaval", waarbij zij in menigte over den modder rondloopen en dan dikwijls gevechten leveren. Men ziet ze dan hunne holen in en uitkruipen, en kunnen dan met de handen gevangen worden". (In the months of July and September the Indians gather great numbers of crabs to be used as food. In these months the animals have their "carnival"; they run around in masses and often fight each other. At that time they may be observed to enter and leave their burrows, and they can be caught by hand). Slightly different is the account given by Schomburgk (1848, vol. 2, p. 443), based on observations made in British Guiana: "August und September sind die Monate, in welchen die Landkrabben (*Gecarcinus ruricola* und *Uca una*) aus den Morästen dem Meere zueilen, um ihre Eier abzulegen. . . Im Februar sieht man die Krabben ebenfalls aus ihren Löchern kommen, und dieses scheint die Zeit ihrer Befruchtung zu sein. Die Männchen fangen an, ihre schöne Farbe und ihren Wohlgeschmack zu verlieren, werden mager, und eine unangenehme, bittere, flüssige Materie füllt den ganzen Körper, die sich nach der Begattungszeit wieder verliert, von wo sie dann wieder nach und nach fetter werden. Gegen Ende Juli nehmen die Krabben wieder zu, und bereiten sich zur Ablegung ihrer Schale vor. Zu dem Ende füllen sie ihre Löcher mit Grashalmen und Blättern, begeben sich dann hinein, verstopfen den Zugang und bleiben ohne Bewegung, bis die alte Schale durch eine neue ersetzt worden ist. Wie lange dieser Zustand währt, lässt sich nicht genau bestimmen". Modern observations on these phenomena are highly desirable.

The first account of Suriname specimens of this species found in the literature is that by Otto Keye (1659) who described the animals as "Lantkrabben, dewelcke haer inde Bosschen houden ende haere holen inde aerde hebben / gelyck hier te Lande de Conynen doen" (land crabs, which live in the woods and have their burrows in the ground, like the rabbits in our country). With "woods" the mangrove forests of the coastal area are evidently meant. The text concerning the crabs as given by Keye (1667) and Anonymus (1676) is literally the same as that of Keye (1659). Linnaeus (1763) gave the first scientific name to the species. His description, which is based on Suriname material collected by Dahlberg, runs as follows: "*Cancer brachyurus cordatus*, thorace laevi cordato integerrimo, chelis subtus muricatis. *Habitat* Surinami. *Majusculus*. Testa cordata apice posteriora respiciente, laevis, margine subcarinato; disco lateribus gibbo; in medio quasi

*H. depressum*. *Inter oculos vix emarginata*. *Oculi cylindrici*. *Palpebra inferior crenulata*. *Chelae laeves, sed subtus valde muricatae verrucis conicis nigris*. *Brachia triangula angulis muricatis*. *Pedes reliqui omnes subtus maxime barbati*". Fermin's (1765) description of the species is rather vague, but can hardly be intended for a different form: "Le Crabe jaune, dont les pattes sont extrêmement longues & velues". One would hardly describe this species as yellow, though the males do have the carapace bluish with yellowish. In the 12th edition of his *Systema Naturae* Linnaeus (1767) repeated his 1763 diagnosis, in which, however, the word "cordato" is changed to "undato"; this is evidently a lapsus. Houttuyn (1769) copied Linnaeus's 1767 diagnosis (with the lapsus) and gave a Dutch translation both of this diagnosis and of the 1763 description, adding some remarks of his own, which, however, add little to our knowledge of the species; furthermore Houttuyn provided a good figure of a specimen from his collection, which figure is reproduced here (textfig. 63). Bancroft (1769) gave the following account of the present species: "Besides the Sea Crabs on the Coast of *Guiana*, there is a species of large Land Crabs living in the mud, in which their holes are made, and which cover all the shores of the sea, and rivers near the sea, at low water, when they appear in the greatest numbers. The body is quadrangular, each angle being two inches and a half long. It is supported by a great number of legs and has two large claws, in shape and size nearly resembling those of a Lobster. Their shells, in different places, are either of a dull white, or a blueish colour". In the German and Dutch translations of Bancroft's work (1769a, 1782) the latin name *Cancer Ruricola* is incorrectly given to this species, accompanied by a citation from P. Browne's (1756, p. 423) account of Jamaica material of *Gecarcinus ruricola* (L.). Fermin's (1769, 1770) description of *Cancer violaceus* was copied from Labat (1724, vol. 1 pt. 2, p. 50), who dealt with a species of *Gecarcinus* from Martinique; as has already been shown above (p. 8), Fermin probably meant to indicate the present species with that name. Hartsinck (1770) gave a Dutch translation of Fermin's (1765) remark on the "Crabe jaune". Stadius Müller's (1775) description is an abbreviated German translation of Houttuyn's account, while his figure is an exact copy of that published by Houttuyn. Fabricius (1775, 1792), Herbst (1783), Olivier (1791) and Latreille (1802-1803) repeated statements by previous authors and do not add anything new to our knowledge of the species, except that Latreille mentioned the occurrence of the species in Cayenne. Collin (1822) just listed the name *Cancer cordatus* among the animal species known to him from Suriname. Kunitz (1805) gave again original observations on the species: "vorzüglich sind die Spinnekrabben geachtet. Letztere haben 2 grosse Scheeren,

6 haarige Füße, und einen plattrunden Körper, der mit einer dünnen krebsartigen Schale überzogen ist, und halten sich in den Spalten und Oeffnungen der Ufer auf". Von Sack (1810) made the following remark about the present species: "the largest of all [crabs] is of a purple colour; but . . . they do not differ in their shape from those in Europe."; the German and Dutch edition do not add anything new. Teenstra (1835, p. 443) remarked: "*Krabben* vindt men er tevens zeer groot, en in eene oneindig grootere hoeveelheid, dan de *kreeften*; leverende tevens een' der smakelijkste en gezochtste schotels op. Gekookt zijn dezelve, evenals de Nederlandsche, rood, ofschoon zulks met de witte krabben het geval niet is; derzelve visch, vooral uit de knijpers, is zeer blank en vast. Fermin telt vier verschillende soorten van de hier zijnde *krabben* op, onder welke de blaauwe met geelachtige schaduw de grootste is" (One also finds large crabs here, which are infinitely more numerous than the lobsters; they make one of the most tasteful and appreciated dishes. They are red when cooked, like the Dutch species (*Cancer pagurus* L.); this is not true, however, for the white crabs. Their meat, especially that of the chelae, is white and firm. Fermin enumerated four different species of crab as occurring here, of these the one coloured blue with shades of yellow is the biggest). Kappler (1881, 1887) distinguished two species of the present genus, which he indicated with the names *Uca una* and *Uca laevis*, both names being originally introduced by H. Milne Edwards, 1837. As shown by later authors these two "species" are nothing but the male and female of *Ucides cordatus* (L.). Kappler (1881, pp. 142, 143) described *Uca una* as follows "Ihre Schale ist beinahe vier, das ganze Thier aber wohl zwölf Zoll breit und drei Zoll lang. Die Füße sind dicht behaart und rothbraun, die Schale bläulich oder gelblich.", a description which in 1887 (p. 201) he altered to "Die Krabbe hat eine ovale Schale von 7 cm Breite bei 5 cm Länge von gelblicher oder bläulicher Farbe. Mit den braunen, dicht behaarten Füßen ist sie bei 25 cm breit. Von den beiden Scheeren, womit sie schmerzhaft kneipen können, bleibt die eine immer kleiner als die andere und erreicht die grössere manchmal eine Länge von 7 cm bei 5 cm Breite". The character of the hairy legs shows that these specimens are the males of *Ucides*. *Uca laevis* was described (Kappler, 1881, p. 143) as being "viel grösser . . . , ihre Schale mehr gewölbt und hellblau gefärbt; die eine Scheere ist bei ihnen immer ziemlich grösser als die andere", while the 1887 version (p. 201) is: "sie ist viel grösser, türkisblau und gelblich, die Schale mehr gewölbt, die Füße sind ohne Haare und die eine Scheere übermässig gross.", which proves (by the character of the naked legs) to be based on female specimens. It is interesting to note that Kappler considered *U. una* to be a species from the sea shore, while

*U. laevis* was supposed by him to occur "stellenweise am Ufer der Flüsse". As to the abundance of the species in Suriname Kappler (1881, p. 142) remarked: "Es ist unglaublich, welche Massen von Krabben den Seestrand bewohnen. Soweit die Schlammküste sich erstreckt, also etwa acht Stunden lang, ist sozusagen Loch an Loch, und zwar sind dieselben gewöhnlich keine zwei Fuss auseinander und immer mehr als einen Fuss tief. Die Krabben sitzen da vor ihren Löchern und nähren sich von Thier- und Pflanzenresten". In 1887 (pp. 200, 201) Kappler wrote about the "unermessliche Menge von Krabben der Gattung *Uca una*, die den beinahe ganz aus blauem Thon bestehenden niederen, von der hohen Meeresflut überschwemmten, 56 Stunden langen Küstenstrich bevölkern. Oft sieht man stundenlang am Meeresufer die [p. 201:] Löcher dieser Tiere, die selten mit mehr als drei Fuss Abstand von einander liegen und stets bewohnt sind". Ortmann (1894), Young (1900), and Thompson (1901) mentioned the occurrence of the species in Suriname, without adding new information. The Penard brothers (1908) mentioned this species (under the incorrect name *Gecarcinus ruri-cola*) as the prey of the crab-falcon. Tesch (1914) described the species and repeated some of the information given by Kappler.

Economic importance. From an economic point of view the present species is, with *Callinectes bocourti*, the most important Suriname crab. It is eaten by all classes of the population of Suriname. The animals are cooked and then prepared in various ways. There is no export of crabs. In certain seasons (July to September) they are far more plentiful than at others and therefore are mostly caught then. They are considered to be quite a delicacy. Already Keye (1659) remarked that "dese zijn boven alle andere seer smaekelyk ende delicaet" (they are more tasty and delicate than any of the other crabs). Bancroft (1769) stated: "They have an agreeable, though somewhat earthy taste, and are much eaten by all the inhabitants, whether Whites, *Indians*, or Negroes". Fermin's (1769, vol. 2, p. 279) account of the catch of crabs in Suriname evidently is largely based on Labat's (1724) book, his description of how to cook and serve the crabs seems to be original (p. 278): "La meilleure maniere d'accomoder les *Crabes*, est de les faire, premièrement, cuire dans l'eau avec du sel. Secondement, de les ouvrir, d'en tirer toute la chair, les oeufs & la graisse, & de les faire ensuite étuver avec du beurre, dans leur propre jus, d'y joindre du biscuit en poudre, un peu de poivre, & beaucoup de jus de citron; & quand le tout est ainsi préparé de les servir. Je puis assurer que c'est un manger extrêmement délicat. On les fait aussi cuire simplement dans l'eau, & on les mange avec du pimentade: ce qui est du goût des Créoles, des Naturels du pays, & des Negres; mais qui ne seroit pas du mien". According to Kunitz (1805) these crabs

are "vorzüglich . . . geachtet", while he gave the following account of two ways to serve them: "Man verspeisst hier die Krabben auf zweyerley Art. Einmal in Wasser abgessotten, wo ihr Unrath mit grünem Pfeffer zu einer Sauce gemacht wird, oder man schält sie auch aus, lässt sie, nachdem man sie gewürzt, in Butter braten und mit feingeriebenem Weissbrode überstreuen". Von Sack (1810) mentions "that being so plentiful here, they serve as one of the principal articles of food to the Indians and negroes". Surprising is Teenstra's (1835) statement "de blaauwe wordt niet gegeten" (the blue crab is not eaten), while he clearly meant to indicate the present species; some mistake must have been made here. Kappler (1881, pp. 141-143) again provided important information. He gave a vivid account of the way in which the Indians of the region of the Marowijne caught the crabs at the mouth of that river: "während die Weiber trockenenes Holz zusammensuchten, um Feuer zu machen, wateten die Männer durch die Mangrovegesträuche in einem zähen Schlamm, indem sie bei jedem Schritte bis an die Kniee einsanken, längs der Küste hin und kamen nach einer halben Stunde so beladen mit den schönsten [p. 142:] und grössten Krabben, (*Uca una*), zurück, dass sie dieselben kaum schleppen konnten" (pp. 141, 142). "Bei niederem Wasserstand sitzen die Krabben immer vor ihren Löchern, wittern sie aber Gefahr, so schliessen sie die Scheeren fest an die Brust, und fliehen schnell zurück. Da sie in dem engen Loch die Scheere nicht ausbreiten können, so kann sie der Indianer, indem er in das Loch greift und beide Scheeren dem Thiere fest an den Leib drückt, herausnehmen, ohne dass sie diese Waffen gebrauchen können" (p. 143). He furthermore spoke of the "grosse Töpfe auf dem Feuer, worin die Krabben gekocht wurden, nachdem man sie zuvor im Sumpfe abgewaschen hatte" (p. 142). The ease with which the crabs are caught is shown by Kappler's (p. 146) remark that "die Indianer noch über 20 Körbe Krabben in weniger als zwei Stunden geholt hatten". The way in which the Indians ate the crabs was described as follows (p. 142): "Als die Krabben gekocht waren, ging es an ein Essen, dem zuzusehen eine Lust war; die Scheeren und Füsse wurden zerklopft, um dass süsse Fleisch zu bekommen; in die Schale voll von grünem Fett und einem schwarzen bitteren Unrath drückten die Indianer in Pfefferbrühe geweichtes Cassavebrod und fuhren so mit Essen fort, bis auch der letzte Krabbe zerklopft war. Das Krabbenessen ist, wenn man blos Scheeren und Füsse nimmt, eine langweilige Arbeit, womit man wohl ein paar Stunden zubringen kann, ehe man recht satt wird". The town population ate the crabs in the following way (p. 142): "In Paramaribo gehört eine Krabbenpastete unter die ersten Leckerbissen des Landes. Das weisse Fleisch der Scheeren und Füsse wird mit Chalotten, Petersilien, Weckmehl, Butter

und Gewürze zu einem Teige gewiegt, die sorgfältig gewaschenen Schalen damit gefüllt und diese im Ofen oder unter einem Aufzugdeckel gar gebacken. Zur Sauce wird das Fett, das sich an den Seiten der Schale befindet, mit etwas Butter gequirlt, zerriebene Citronenschalen, Gewürznelken, Muskatblüthe und spanischer Pfeffer hinzugethan und das Ganze kochend heiss mit einem Wasserglas voll Cognac oder Rum verdünnt; die Sauce sieht dunkelgrün aus und wird mit den Pastetchen gegessen". According to Tesch (1914, p. 250) this crab dish is named *kraboe-hoso* in Suriname.

***Cardisoma guanhumi*** Latreille, 1825 (pl. XII)

Museum Paramaribo

Mouth of Suriname River near "Purmerend" plantation, Leonsberg, N. of Paramaribo; caught in a shrimp trap; May 1957; H. W. Lijding. — 1 male.

Description. Rathbun, 1918, p. 341, textfig. 155, pls. 106, 107.

Remarks. The carapace breadth of the above specimen, a full-grown male, is 100 mm.

Colour. The carapace of the living specimen was noted to be slate-blue.

Type locality. Brazil.

Distribution. Bermuda, the Bahamas and S. Florida to S. Brazil and the West Indies.

Occurrence in Suriname. In Suriname the present species is only known from the above specimen, which was taken in a highly unusual place. The species is namely one of the typical land crabs of the West Indies, and it is difficult to explain how the present specimen got caught in a shrimp trap. More information on whether and where the species actually occurs in Suriname would be highly welcome.

Family Ocypodidae

***Ocypode quadrata*** (Fabricius, 1787) (pl. IX fig. 3)

*Cancer albicans minor littoralis* Fermin, 1765, p. 73.

*Cancer albicans, minor* Fermin, 1769, vol. 2, p. 276; Fermin, 1770, vol. 2, p. 249.

"Witte Krab" Hartsinck, 1770, p. 118.

"Land Crab" Von Sack, 1810, p. 274.

"Landkrebs" Von Sack, 1821, vol. 1, p. 230.

"Land-kreeft" Von Sack, 1821a, vol. 2, p. 247.

"Sandkrabbe" Kappler, 1887, p. 201.

Museum Leiden

Right bank of the mouth of the Suriname River near Braamspunt; in holes in the sandy part of the beach; 5 April 1957; L. B. Holthuis no. 1219. — 7 males, 5 females.

Beach near the mouth of the Matappica Creek; 20 October 1940; D. C. Geijskes. — 1 female.

Beach near the Wiawia Bank, N. E. Suriname; dug out of holes in the sand; 11 November 1948; 1948-1949 Suriname Expedition no. 2618. — 6 males, 1 female.

Beach near the mouth of the Marowijne River near Galibi; dug out of the sand; 9 November 1948; 1948-1949 Suriname Expedition no. 2517. — 1 male, 3 females.

Description. Rathbun, 1918, p. 367, pls. 127, 128 (as *O. albicans* Bosc).

Remarks. The carapace breadths of the males examined vary between 22 and 47 mm, those of the females between 21 and 32 mm.

Type locality. Jamaica.

Distribution. East coast of America from Bermuda and Rhode Island (U.S.A.) to S. Brazil and the West Indies. Graham (1955, pp. 37, 77) reported upon this species from British Guiana and named it "White Land Crab" or "Ghost Crab".

Occurrence in Suriname. The species is only found on the sea coast where there are sandy beaches. It lives in holes which it digs in the sand somewhat above high tide mark. The holes are rather deep; they are much narrower than those of *Ucides*, so that in order to obtain the specimens one has to actually dig them out. The animals are fast runners, and when pursued flee either in their holes or in the water. They are nocturnal and seldom leave their holes in the daytime. The first record of this species from Suriname is that by Fermin (1765) who named the species "le Crabe blanc, en Latin *Cancer albicans minor littoralis*". Fermin (1769, 1770) with the name "*Cancer albicans, minor*" evidently also meant to indicate the present species, though his description is copied from that by Labat (1724, vol. 1 pt. 2, p. 50) of "les crabes blancs" which are specimens of *Cardisoma guanhumi* from Martinique. Hartsinck's (1770) remark concerning the "witte Krab" is a translation of that by Fermin (1765) on the "Crabe blanc". Von Sack's (1810) second species of land crab which "is large and white" can hardly be anything but the present species. The German and Dutch translations of Von Sack's book do not give any additional details. Kappler's (1887) account of the species gives, as is usual with this author, an excellent characterization: "die Sandkrabbe, ist kaum 12 cm breit und 4 cm lang, gelblich-weiss von Farbe mit mehr eckiger als gewölbter Schale; sie lebt am sandigen Seestrand in selbstgegrabenen Löchern, [p. 202:] flüchtet aber, wenn sie von ihrem Loche entfernt ist, sich sogleich ins Wasser. Auf dem Feuer geröstet, schmeckt sie sehr gut".

### ***Uca (Uca) maracoani*** (Latreille, 1802-1803) (pl. XIII)

Museum Leiden

Coronie; 26 June 1911; W. C. van Heurn. — 5 males, 2 females.

East bank of the mouth of the Coppename River near Boskamp, about 95 km W. of

Paramaribo; soft mud; 2 April 1957; L. B. Holthuis no. 1214. — 10 males, 4 females (1 ovigerous).

East bank of the mouth of the Suriname River near Braamspunt; soft mud; 5 April 1957; L. B. Holthuis no. 1219. — 15 males, 1 female.

Bank of the Suriname River near the ferry, Leonsberg, N. of Paramaribo; 10 December 1939; D. C. Geijskes. — 5 males, 2 females.

Bank of the Suriname River near plantation "Morgenstond", N. of Paramaribo; 15 December 1939; D. C. Geijskes. — 2 males, 2 females.

Suriname River near Paramaribo; 23 March 1939; H. W. C. Cossee. — 1 male.

Paramaribo; 1911; W. C. van Heurn. — 1 male, 1 female.

Suriname River near plantation "La Resource"; 19 December 1939; D. C. Geijskes. — 4 males, 1 female.

Fisheries Service Station "Matappica" at Matappica Canal, about 2 km from the sea coast; in muddy ditch; 6 April 1957; L. B. Holthuis no. 1221. — 1 male.

Mouth of Matappica Canal; tidal zone, in mud; 15-30 August 1957; A. C. J. Burgers. — 49 males, 89 females (1 ovigerous).

Sea shore near Wiawia Bank, N. E. Suriname; high up the beach in mud; 12 November 1948; 1948-1949 Suriname Expedition no. 2622. — 6 males, 1 female.

Description. Rathbun, 1918, p. 378, pl. 130 figs. 2, 3, pl. 131 fig. 3.

Vernacular name. According to Dieperink (see below) the species is named in Dutch "Duivelskrab" (Devil's crab); however, this name seems to be used mostly for *Goniopsis*.

Remarks. The specimens have the carapace breadths varying between 10 and 45 mm. The ovigerous females have cb. 30 and 33 mm, the largest female has cb. 35 mm.

In the juvenile males the fingers of the large chela are less than twice as long as the palm, while the fixed finger is not as much twisted at the tip as in the adults. One of the large specimens from near Boskamp has the carapace and the large chela as if crumpled; though the specimen is perfectly hard-shelled it looks at first glance like a poorly preserved soft-shelled one.

The species may be immediately recognized from all other Suriname fiddler crabs by the very high and flattened fingers of the large chela of the male and by the very narrow rostrum which is constricted at the base.

Type locality. "Le continent de l'Amérique méridionale" (Latreille, 1802-1803b, p. 46). Restricted by Rathbun (1918, p. 378) to Brazil.

Distribution. N. E. coast of the South American continent from Venezuela to S. E. Brazil (Rio de Janeiro). An old record (by Sloane, 1725) of the species from Jamaica is very doubtful. Graham (1955, p. 33, pl. 4 fig. 4) dealt with British Guiana material of this species which she named "Scissors Crab"; the identification on her p. 77 with *Uca pugnax* is incorrect.

Occurrence in Suriname. *Uca maracoani* is now for the first time reported from Suriname. It was found there in holes in the soft mud of that part of the river banks which had no vegetation and which was exposed at

low tide only. In such localities the species was observed in fairly large numbers. In a handwritten list of the specimens sent by him on 24 May 1825 to the Leiden Museum Dieperink mentioned "Twee duivelskrabben zijn van de kleinste. Zij worden voor vergiftig gehouden en by Linnaeus pl. 104.2 afgebeeld" (Two devil's crabs, belonging to the smaller species. They are considered to be poisonous and are figured on pl. 104 fig. 2 of Houttuyn's). The reference to Houttuyn distinctly shows that the present species is meant.

***Uca (Minuca) mordax*** (Smith, 1870) (textfig. 64a-c;  
pl. XIV fig. 2, pl. XV fig. 2)

Museum Leiden

Cocos Polder, Coronie; bank of a ditch south of the east-west dike which divides the polder in two halves; just above water level; 11 April 1957; L. B. Holthuis no. 1237. — 2 males, 1 female.

Cocos Polder, Coronie; bank of a ditch on the south side of the outer (= sea) dike; 11 April 1957; L. B. Holthuis no. 1238. — 4 males.

Muddy bank of ditch near the mouth of the Coppename River near Boskamp, about 95 km W. of Paramaribo; 2 April 1957; L. B. Holthuis no. 1213. — 4 males, 8 females (1 with Sacculinid).

Muddy shore of the Coppename River near its mouth, Boskamp; 2 April 1957; L. B. Holthuis no. 1214. — 11 males, 3 females.

Bank of the Saramacca River near Carl François, about 80 km W. of Paramaribo; 2 April 1957; L. B. Holthuis no. 1210. — 15 males, 6 females.

Saramacca River near Groningen; September 1911; W. C. van Heurn. — 1 female.

Bank of Suriname River near plantation "Purmerend", Leonsberg, N. of Paramaribo; 1 April 1957; L. B. Holthuis no. 1208. — 8 males, 4 females (2 ovigerous).

East bank of the mouth of the Suriname River near Braampunt; mud; 5 April 1957; L. B. Holthuis no. 1219. — 1 male.

Bank of Suriname River near the ferry, Leonsberg, N. of Paramaribo; 28 December 1939; D. C. Geijskes. — 1 female.

Plantation "Morgenstond", N. of Paramaribo; in coffee field near trench; 19 October 1939; D. C. Geijskes. — 2 males.

Charlesburgweg, Paramaribo; in trench; 5 January 1940; D. C. Geijskes. — 5 males.

Agricultural Experiment Garden, Paramaribo; in trenches; 10 February, 25 September, 21 October, and 7 December 1939; D. C. Geijskes. — 47 males, 17 females.

Saramacca Canal, Lelydorpse weg, Paramaribo; 16 December 1939; D. C. Geijskes. — 10 males, 4 females.

Paramaribo; 1911, and October 1911; W. C. van Heurn. — 24 males, 16 females (3 ovigerous).

Suriname River near plantation "La Resource", S. of Paramaribo; 19 December 1939; D. C. Geijskes. — 1 male.

Bank of the Para River near its confluence with the Suriname River, between Paramaribo and Domburg; muddy shore; 31 March 1957; L. B. Holthuis no. 1202. — 1 male, 2 females (1 ovigerous).

Domburg, S. of Paramaribo; under pieces of wood in a small creek emptying into the Suriname River; muddy bottom; 31 March 1957; L. B. Holthuis no. 1204. — 6 males, 1 female.

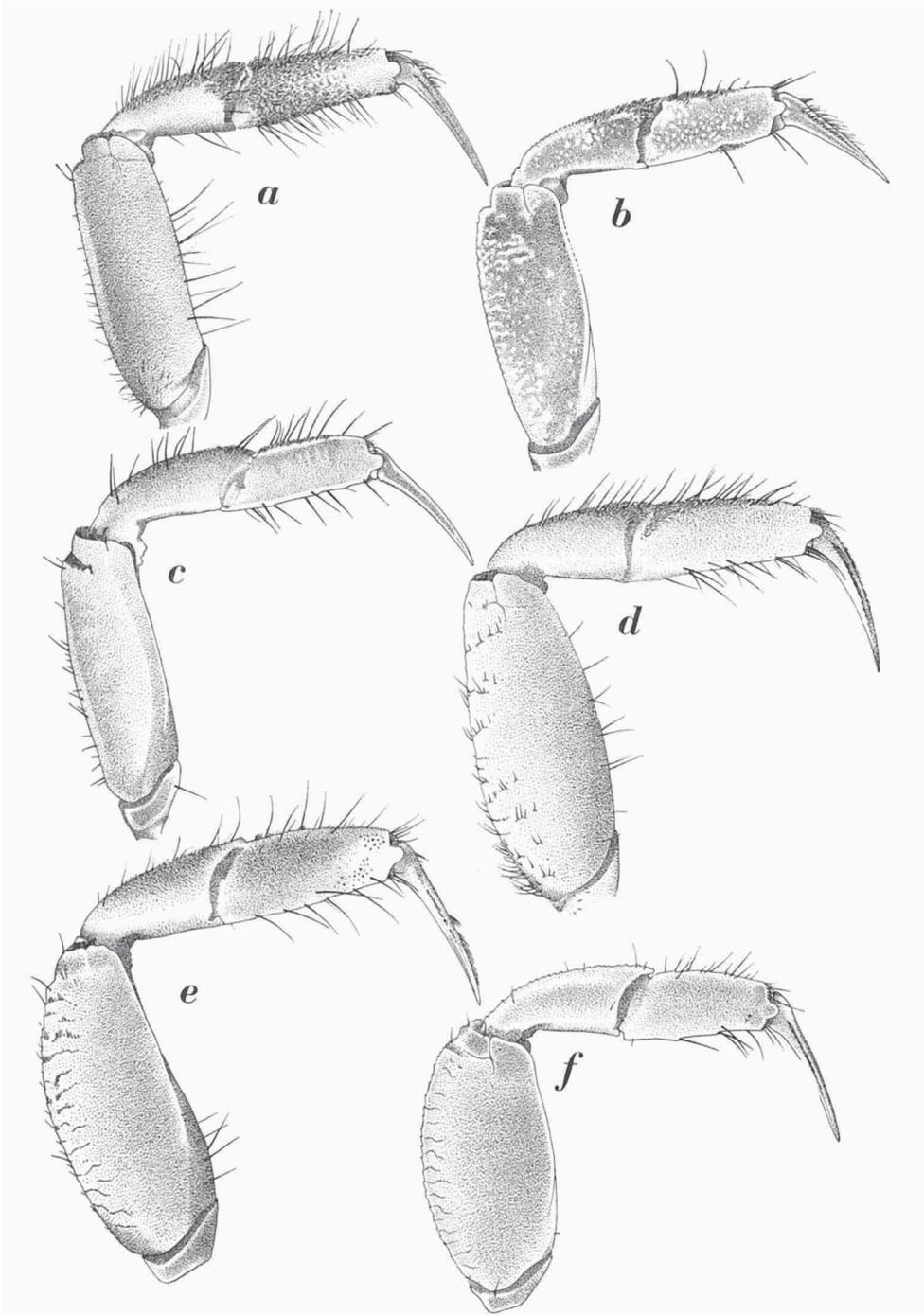


Fig. 64. *Uca mordax* (Smith). a, second pereiopod of male; b, fifth pereiopod of female; c, fifth pereiopod of male. *Uca rapax* (Smith). d, second pereiopod of male; e, fifth pereiopod of male; f, fifth pereiopod of female. a,  $\times 3.2$ ; b,  $\times 3.5$ ; c-f,  $\times 4$ . H. Heijn del.

Suriname River near plantation "Thorarica", S. of Domburg; in swamp creek; 6 February 1957; D. C. Geijskes. — 6 males, 2 females.

North coast of Suriname just west of the mouth of the Matappica Canal; 6 April 1957; L. B. Holthuis no. 1222. — 1 female.

Mouth of the Marowijne River near Galibi; small creek near plantation; 9 November 1948; 1948-1949 Suriname Expedition no. 2512. — 5 males, 2 females.

Mouth of the Marowijne River near Christiaankondre; August 1957; A. C. J. Burgers. — 3 males, 1 female.

Muddy creeks near the Marowijne River at Albina; slightly brackish water; 7 September 1939; D. C. Geijskes. — 8 males, 4 females.

Albina on the Marowijne River; 25 July 1911; W. C. van Heurn. — 4 males.

Suriname; 1890; H. F. C. ten Kate. — 1 male.

Suriname; 17 September 1894; Miss M. Koning. — 2 males, 2 females.

Suriname; 1939; D. C. Geijskes. — 1 male.

#### Museum Amsterdam

Suriname. — 2 males.

#### Museum Berlin

Paramaribo; brackish water; 28 August 1908; C. Heller. — 2 males, 3 females.

Paramaribo; H. B. Möscher. — 1 female.

Upper Commewijne River; February 1908; C. Heller. — 1 female.

Suriname; J. Michaelis. — 19 males, 53 females.

#### Museum Hamburg

Paramaribo; J. Michaelis, received 31 January 1889; C. Heller, received 4 August and 16 December 1908. — 16 males, 10 females (1 ovigerous).

Paramaribo; November-December 1908; C. Heller. — 2 males, 3 females.

Description. Smith, 1870, p. 135, pl. 2 fig. 3, pl. 4 fig. 4; Crane, 1943, p. 37; Crane, 1943a, p. 31, textfigs. 1A-C, pl. 1 figs. 3, 4.

Remarks. The carapace breadth of the specimens examined varies between 5 and 26 mm, the ovigerous females having the carapace breadth ranging from 10 to 20 mm.

With the four following the present species forms the broadfronted group (subgenus *Minuca* Bott, 1954) of the genus *Uca* as represented in Suriname. The differences between these five species are not very striking so that several of the species have been confused by previous authors. The main distinctive characters of *U. mordax* are the following: The breadth of the front when measured at the base (i.e., at the spot where the upper and lower margins of the eyebrow meet) is more than 1/3 of the anterior breadth of the carapace. The teeth on the lower orbital margin are inconspicuous in the inner part, becoming somewhat larger externally. The suborbital region is hairy. As a rule the large chela of the adult male does not show a distinct lower carina. The upper part of the outer surface of the palm is strongly

curved inward so that it might be considered to form the upper surface of the palm. The dorsal marginal carina of the carpal cavity on the inner surface of the palm at first runs parallel to the upper margin of the palm, then curves downwards and is directed somewhat forwards in its extreme distal part. Anteriorly to this margin the inner surface of the palm is distinctly concave and smooth. Below this concavity the surface shows many distinct tubercles. The upper of these tubercles are sometimes arranged in a horizontal row which more or less forms a continuation of the dorsal marginal carina of the carpal cavity, which thereby seems to extend to the base of the dactylus. The two rows of tubercles near the lower part of the base of the dactylus diverge strongly. The oblique ridge which extends from the lower margin of the palm to the carpal cavity is distinct and bears various tubercles, which are not arranged in a single row. Where the ridge reaches the cavity there are several distinct tubercles, but no distinct upwards directed row is formed. The tip of the fixed finger is trifid. The upper margin of the meri, the upper part of the carpi, and the entire propodi of the first three pairs of walking legs are covered with a short velvety pubescence in which there are a few long and stiff dark bristles. The fifth pereopod (= fourth walking leg) differs from the previous legs by having the propodus with a velvety pubescence only in the proximal part of the upper and sometimes also in the distal part of the lower margin. In juvenile specimens the pubescence is generally less extensive. The legs of the present species are slender, being distinctly more narrow than in *U. rapax*. In the female they are wider than in the male (textfig. 64a-c). The male pleopod of this species has been accurately figured by Crane (1943a).

Type locality. "Canals at Pará" (= Belém), Brazil.

Distribution. The species is known with certainty from the north coast of the South American continent, from Venezuela to N. Brazil. It has been reported from the larger part of the West Indies, but these reports all need confirmation. Most, if not all, the Antillean specimens referred to as *U. mordax*, namely, actually belong to a distinct species, *U. affinis* (Streets). This species differs from *U. mordax* in the following points: (a) the denticles on the lower orbital margin, and especially those in its external part, are larger and more distinct, (b) the lower margin of the palm of the large chela of the male has practically always a distinct carina, (c) the dorsal marginal carina of the carpal cavity on the inner surface of the large chela is not curved forwards, but follows the margin of the cavity and ends in a group of distinct tubercles, (d) the oblique carina extending from the lower margin of the chela to the carpal cavity shows a more or less distinct row of tubercles, which at the carpal cavity curves upwards

following the margin of the cavity, (e) the posterior of the two rows of tubercles near the base of the dactylus consists of larger tubercles, which are placed closer together, and (f) the lower half of the propodi of the walking legs does not show any velvety pubescence. The Leiden Museum possesses an extensive series of specimens of *U. affinis* from the West Indies (St. Thomas, St. Croix, Anguilla, St. Martin, Nevis, Barbuda, Antigua, Tobago, Aruba, Curaçao, Bonaire, Aves Islands) among which there are syntypes of the species (St. Martin, leg. H. E. van Rijgersma, don. Mus. Philadelphia). This material clearly shows that the differences between the two species are constant. Some of the West Indian specimens mentioned by Rathbun (1918) under *Uca mordax* were compared with material of *U. affinis* now in the Leiden Museum and proved to be conspecific with it. Rathbun's (1918, pl. 134 figs. 3, 4) plate shows a specimen (from British Honduras), which might be *Uca vocator* (Herbst) (see p. 274). The only certain records of the species therefore are those by Crane (1943) from Venezuela and by Smith (1870) from Belém, Brazil. The Leiden Museum possesses furthermore 4 males and 2 females from Ilha do Marajó near Belém, N. Brazil (near farm of L. Santos, 8 June 1954, leg. W. Forster & O. Schindler, don. Mus. Munich).

Occurrence in Suriname. Though there are no previous Suriname records of the species, it is quite common there. It is found near the mouths of the rivers in muddy places where the water is salt or brackish. It is found higher up the rivers than any of the other species and probably can tolerate lower salinities; this conclusion checks quite well with Crane's (1943) observations. The name for the fiddler crabs, "odi odi botoman" (= bye, bye, man in the boat) therefore probably is mainly based on this species.

***Uca (Minuca) rapax*** (Smith, 1870) (textfigs. 64d-f, 65;  
pl. XIV figs. 4-6, pl. XV fig. 3)

Museum Leiden

Cocos Polder, Coronie; bank of a ditch south of the east-west dike which divides the polder in two halves; just above water level; 11 April 1957; L. B. Holthuis no. 1237. — 4 males, 4 females.

Cocos Polder, Coronie; bank of a ditch on the south side of the outer (= sea) dike; 11 April 1957; L. B. Holthuis no. 1238. — 4 males.

Cocos Polder, Coronie; in dry mud north of the outer dike; 11 April 1957; L. B. Holthuis no. 1239. — 9 males, 4 females.

In parwa (= *Avicennia nitida* Jacq.) forest between the Cocos Polder and the sea, Coronie; rather dry muddy bottom; 11 April 1957; L. B. Holthuis no. 1241. — 13 males, 4 females.

Coronie; June 1911; W. C. van Heurn. — 8 males, 2 females.

Up to 3 km N of the highway between Coronie and Paramaribo at 21.6 km E. of

Coronie; 21 December 1948; 1948-1949 Suriname Expedition nos. 4413, 4416. — 26 males, 7 females (1 ovigerous), 1 intersex.

2.6 to 2.7 km N. of the highway Coronie-Paramaribo at 21.6 km E. of Coronie; 21 December 1948; 1948-1949 Suriname Expedition no. 4419. — 5 males, 1 female.

3 km N. of the highway Coronie-Paramaribo at 21.6 km E. of Coronie; parwa (= *Avicennia nitida* Jacq.) forest, clayish bottom; 20 December 1948; 1948-1949 Suriname Expedition no. 4410. — 2 females.

Muddy bank of ditch near the mouth of the Coppename River near Boskamp, about 95 km W. of Paramaribo; 2 April 1957; L. B. Holthuis no. 1213. — 7 males, 4 females.

Muddy shore of Coppename River near its mouth, Boskamp; 2 April 1957; L. B. Holthuis no. 1214. — 20 males, 3 females.

Bank of the Suriname River near plantation "Purmerend", Leonsberg, N. of Paramaribo; 1 April 1957; L. B. Holthuis no. 1208. — 10 males, 10 females.

East bank of the mouth of the Suriname River near Braamspunt; mud; 5 April 1957; L. B. Holthuis no. 1219. — 21 males, 4 females.

Suriname River near Paramaribo; 1907; M. D. Horst. — 1 male, 2 females.

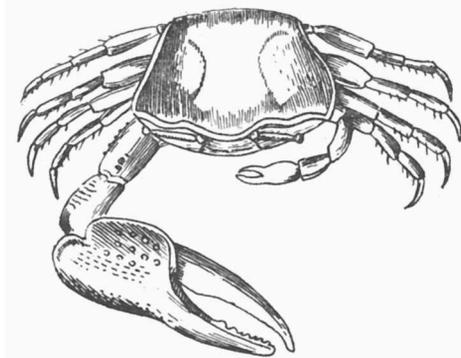


Fig. 65. *Uca rapax* (Smith)? After De Geer, 1778.

Fisheries Service Station "Matappica" at Matappica Canal, about 2 km from the sea coast; in muddy ditch; 6 April 1957; L. B. Holthuis no. 1221. — 4 males, 2 females.

Mouth of Matappica Canal; mangroves; 15-30 August 1957; A. C. J. Burgers. — 102 males, 54 females (1 ovigerous).

Sea shore near the Wiawia Bank, N. E. Suriname; parwa (= *Avicennia nitida* Jacq.) forest, muddy bottom; 12 November 1948; 1948-1949 Suriname Expedition no. 2632. — 6 males, 2 females (1 ovigerous).

Suriname; 1939; D. C. Geijskes. — 1 female.

#### Museum Amsterdam

Paramaribo; Koloniaal Instituut. — 14 males, 1 female.

Suriname; Koloniaal Instituut. — 3 males.

#### Museum Hamburg

Paramaribo; C. Heller; received 4 August 1908. — 1 female.

Description. Rathbun, 1918, p. 397, pl. 140; Crane, 1943, p. 40, figs. 1A-C.

Remarks. The carapace breadth of the specimens examined varies between 9 and 34 mm, the ovigerous females having cb. 12 to 27 mm. The species

attains a larger size than *Uca mordax*. The main differences between the two are:

1. The front in *U. rapax* is less than  $1/3$  of the anterior breadth of the carapace.

2. The teeth on the lower orbital border are distinct, especially the external being conspicuous.

3. The palm of the large chela in the male, even in very large specimens, shows a distinct lower carina.

4. The dorsal marginal carina of the carpal cavity follows the margin of the cavity, and in its distal part is directed downward. It is not connected with the base of the dactylus by a row of tubercles.

5. The oblique carina in the lower half of the inner surface of the palm of the large chela shows a distinct row of tubercles, which near the carpal cavity sometimes curves upwards, following the margin of the cavity.

6. The two rows of tubercles on the inner surface of the palm near the base of the dactylus are parallel and stand close together.

7. Between the posterior of these rows and the carpal cavity there are only a few very small tubercles.

8. The first three walking legs show a short velvety pubescence on the upper margin of the merus and in the upper part of the carpus and propodus. The lower part of the latter two joints, even in old specimens, is without this velvety pubescence, though stiff and long bristles are scattered all over the legs.

9. The walking legs in *U. rapax* have the merus wider than in *U. mordax*.

10. The male pleopods differ in shape (cf. Crane, 1943, fig. 1A-C, and Crane, 1943a, fig. 1A-C).

Among the material collected east of Coronie (1948-1949 Suriname Expedition nos. 4413, 4416) an interesting aberrant specimen was found. This specimen, cb. 19 mm, has both chelipeds rather well developed, each being somewhat smaller than the large chela of a normal adult male. The two chelae are of practically the same size, measuring 16 mm. The tubercles, the ridges and the carpal cavity on the inner surface of the palm are far less distinct than in normal males. The width of the merus of the pereopods is about intermediate between those found in normal males and in normal females of this species. The abdomen is distinctly wider than that of a male, but much narrower than that of a female. Four pairs of pleopods are present, resembling those of a female, but in the first two the exopod is rather poorly developed. In my opinion the specimen has to be considered an intersex, as it combines male characters (large chela), with female (equal chelipeds; pleopods) and intermediate characters (walking legs; breadth of

abdomen). I do not know of any previous record of this phenomenon in *Uca rapax*, but Smith (1870a, p. 557) reported upon a male specimen of *Uca pugnax* (Smith), named by him *Gelasimus palustris*, from near New Haven, Connecticut, U.S.A., in which the "left cheliped is exactly like the larger cheliped of ordinary specimens, while the right one differs only in being a very little smaller, and in having the fingers slightly more incurved at the tips. In this character of equal chelipeds it agrees with the genus *Heloecius*. The specimen was very lively, and used both hands with equal facility". Morgan (1920, pp. 227, 228, fig. 1D) reported on a male of *Uca pugilator* (Bosc) with two large chelae and stated "It is interesting to note in the case of this male with two large claws that it differs from the ordinary males by doubling the kind of difference that distinguishes the normal male from the female. It can scarcely be said to be an inter-sex, for the difference is not in the direction of the opposite sex, but away from it. If some designation is called for, it might be said to be a super-male, or at least an over-clawed male". Unfortunately Morgan does not mention the other sexual characters of his specimen, which, if a true male, certainly is different from the Suriname specimen, which actually does have the features of an intersex (pl. 14 figs. 5, 6).

Type locality. Colon (= Aspinwall), Atlantic coast of Panama.

Distribution. S. Florida to Brazil and the West Indies. Graham (1955, p. 34, pl. 4 fig. 7) dealt with material from British Guiana, to which she gave the name "Mud Crab".

Occurrence in Suriname. *Uca rapax* is found in great numbers in the muddy areas of the coastal region of Suriname, in mangrove forests along the coast, as well as along the rivers and in ditches. In the Cocos Polder near Coronie the banks of the ditches were riddled with the holes of myriads of *Uca*, most of them belonging to the present species (pl. 2 fig. 2). *Uca rapax* is not found as far up the rivers as *U. mordax*, probably it does not tolerate the lower salinity there; Crane (1943) came to a similar conclusion with Venezuelan material. As far as I know, the species has not been reported before from Suriname. There is a possibility, however, that the specimen described and figured by De Geer (1778, p. 430, pl. 26 fig. 12) as *Cancer vocans* from "l'ocean de l'Amérique" is a specimen of the present species collected by Rolander in Suriname (fig. 65).

***Uca (Minuca) vocator*** (Herbst, 1804) (textfigs. 66, 67;  
pl. XIV fig. 1, pl. XV fig. 1)

Museum Leiden

Shore east of the mouth of the Nickerie River; 3 July 1949; D. C. Geijskes. —  
1 ovigerous female.

Cocos Polder, Coronie; in ditches near the projected pumping installation; muddy bottom; 11 April 1957; L. B. Holthuis no. 1240. — 1 female.

Dike on the north side of the Cocos Polder, Coronie; bank of ditch on the south side of the dike; 11 April 1957; L. B. Holthuis no. 1238. — 9 males.

Cocos Polder, Coronie; bank of a ditch south of the east-west dike which divides the polder in two halves; just above water level; 11 April 1957; L. B. Holthuis no. 1237. — 2 males.

2.6 to 2.7 km N. of the highway from Coronie to Paramaribo at 21.6 km E. of Coronie; 21 December 1948; 1948-1949 Suriname Expedition no. 4419. — 1 male, 1 female.

Muddy bank of ditch near the Coppename River near its mouth, Boskamp, about 95 km W. of Paramaribo; 2 April 1957; L. B. Holthuis no. 1213. — 2 males, 2 females.

Muddy shore of the Coppename River near its mouth, Boskamp; 2 April 1957; L. B. Holthuis no. 1214. — 2 males.

Bank of the Suriname River near plantation "Purmerend", Leonsberg, N. of Paramaribo; 1 April 1957; L. B. Holthuis no. 1208. — 1 male.

Agricultural Experiment Garden, Paramaribo; in trench; 25 September, 21 October, and 7 December 1939; D. C. Geijskes. — 11 males, 7 females.

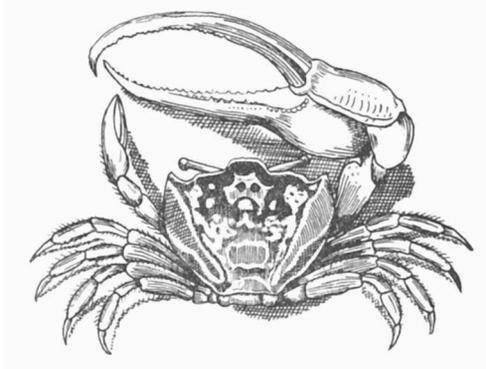


Fig. 66. *Uca vocator* (Herbst). After Herbst, 1804.

Paramaribo; 1911; W. C. van Heurn. — 1 female.

Bank of the Para River near its confluence with the Suriname River, between Paramaribo and Domburg; muddy shore; 31 March 1957; L. B. Holthuis no. 1202. — 23 males, 16 females (1 ovigerous).

Mouth of Matappica Canal; mud, mangroves; 15-30 August 1957; A. C. J. Burgers. — 21 males, 4 females (1 ovigerous).

Sea shore near the Wiawia Bank, N.E. Suriname; parwa (= *Avicennia nitida* Jacq.) forest, muddy bottom; 12 November 1948; 1948-1949 Suriname Expedition no. 2632. — 5 males, 2 females.

Galibi on the Marowijne River; small creek near plantation; 9 November 1948; 1948-1949 Suriname Expedition no. 2512. — 2 males, 1 female.

Suriname; don. Zoological Laboratory Utrecht. — 1 male.

#### Museum Berlin

Paramaribo; sea shore; C. Heller. — 1 male.

Paramaribo; brackish water; 28 August 1908; C. Heller. — 4 males, 1 female.

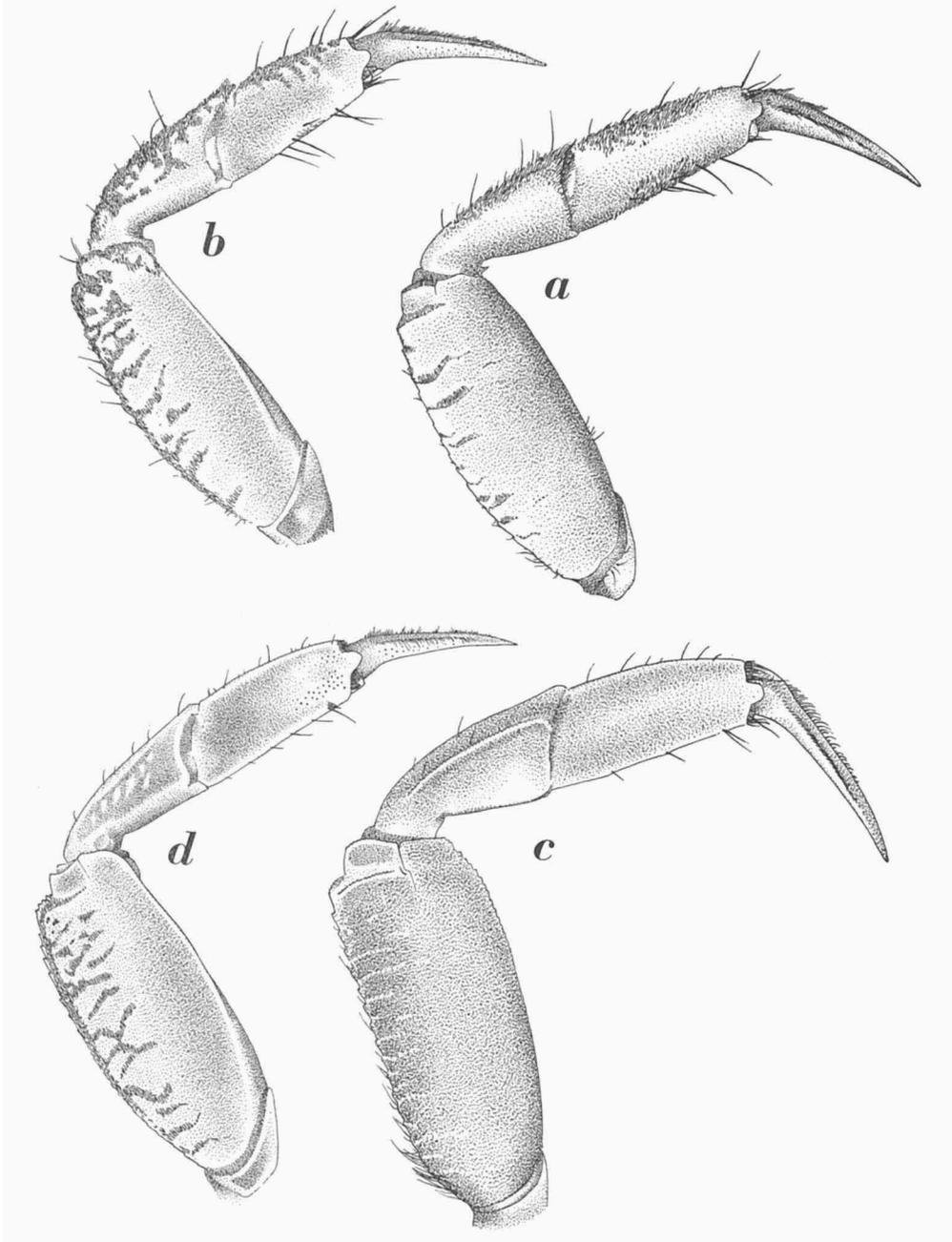


Fig. 67. *Uca vocator* (Herbst). a, second pereiopod of male; b, fifth pereiopod of male; c, second pereiopod of female; d, fifth pereiopod of female. a-c,  $\times 5.5$ ; d,  $\times 5$ . H. Heijn del.

## Museum Hamburg

Paramaribo; J. Michaelis, received 31 January 1889; C. Heller, received 4 August and 16 December 1908. — 8 males, 5 females.

Description. Crane, 1943, p. 38, textfigs. 1D-F, pl. 1 figs. 1, 2 (as *U. murifecenta* Crane).

Remarks. The carapace breadths of the specimens examined vary between 9 and 30 mm. The ovigerous females have cb. 21 to 25 mm; they were collected in the months of March, July, and August.

The specimens agree excellently with Crane's description. In all the male specimens the upper surface of the carapace shows an irregular pattern of a brownish or greyish short pubescence, which distinguishes this species from most other Suriname *Uca*'s. In the females this pubescence is often hardly noticeable, but here the carapace has a field of distinct, though small tubercles extending along the lateral and posterior margins. The front occupies one third of the anterior breadth of the carapace and is somewhat truncated anteriorly. In the males the lower margin of the fixed finger of the large chela lies on a lower level than that of the palm, so that a curve is formed where the one meets the other. The oblique ridge on the inner surface of the palm is tuberculated, but the tubercles are numerous and small and do not or hardly differ in size or density from those found on the rest of the lower half of the inner surface of the palm. The dorsal marginal carina of the carpal cavity curves down and ends in a field of conspicuous tubercles. The two rows of tubercles near the base of the dactylus are diverging. The tip of the fixed finger is trifid. In the upper part of the posterior surface the meri of the first three walking legs of the male show a distinct velvety pubescence, which sometimes also extends slightly on the anterior surface. This pubescence is of an irregular pattern in which vertical lines dominate. The carpus is velvety pubescent except for the lower surface which is devoid of this pile. The velvety pubescence covers the propodus entirely but for a smaller or larger spot in the distal part of both the anterior and posterior surfaces, and one in the proximal ventral part. In the fifth legs the pubescence is visible in the upper part of merus, carpus, and propodus. In the females—though traces of a velvety pubescence may be seen on the merus—the carpus and propodus of the walking legs show no trace of such a pubescence, while only a very few scattered bristles are present; distinct tubercles are present on the posterior surface of the carpus and propodus of the second and third, and on the upper part of these joints in the first walking legs. The merus of the fifth pereopod in the female is, like in the other species of *Uca*, distinctly wider than in the male. The naked carpus and propodus of the first three walking legs of the females of

*U. vocator* serve as an easy means to distinguish these females from those of *U. mordax* and *U. rapax*.

For a long time the identity of Herbst's (1804, p. 1, pl. 59 fig. 1) *Cancer vocator* has been a puzzle, and in the older literature this name has often incorrectly been used for other species of the subgenus *Minuca*. In my opinion, however, there can be little doubt that *Cancer vocator* is identical with *Uca murifecenta* Crane, 1943. Herbst's figure shows an irregular light pattern on the carapace, very similar to that formed on the carapace of *U. murifecenta* by the lighter pubescence. Furthermore in his diagnosis Herbst stated "thorace rugoso". The front of the specimen figured by Herbst agrees quite well with that of *U. murifecenta*. The inner surface of the large chela of Herbst's male shows the posterior of the two rows of tubercles at the base of the dactylus, while there is no trace of the oblique carina, an indication that the latter is not very conspicuous. Herbst stated the fixed finger of the large chela to be without a tooth in the middle of the cutting edge, but in my material such a tooth, be it sometimes very indistinctly, is always present. I can find no other discrepancies between Herbst's description and figure and the present species, apart from a few minor points in the figure which may be due to inaccuracy of the artist. Unfortunately the type specimen of *Cancer vocator* is no longer extant as Dr. H.-E. Gruner of the Berlin Zoologisches Museum was so kind to inform me (1 December 1958, in litt.). Therefore, in order to settle the identity of *Cancer vocator* definitely it seems necessary to select the most typical and best preserved male specimen of the material examined, namely the male (cb. 26 mm) from the shore of the Suriname River near "Purmerend" plantation, Leonsberg, N. of Paramaribo, Suriname (1 April 1957, L. B. Holt-huis no. 1208) as the neotype of *Cancer vocator* Herbst, 1804. The specimen forms part of the collection of the Rijksmuseum van Natuurlijke Historie at Leiden under the registered number Crustacea D 12329. Through this selection the type locality is restricted to Suriname. This seems the more logical as according to Herbst's (1804, p. 6, line 1 from top) own remark he obtained American Crustacea from persons in Holland, and the chances that these actually came from Suriname are great. The present actions have the advantage that (1) the specific name *vocator* is now used for the species to which it in all probability was given by its original author, (2) this name has ceased to be a threat to the stability of well established names used for related species of *Uca*, and (3) it replaces a specific name which has only recently been proposed and which is not yet in general use.

Type locality. "Das Vaterland ist Amerika" (Herbst, 1804, p. 1). By the above neotype selection the type locality is restricted to the west bank of the

Suriname River near plantation "Purmerend", Leonsberg, N. of Paramaribo, Suriname.

Distribution. The present species was described as new by Crane (1943), who based her description on material from various localities in Venezuela (mouth of the San Juan River, Pedernales, and Maracaibo). It seems altogether possible that the specimen from Belize, British Honduras, figured by Rathbun (1918, pl. 134 figs. 3, 4) under the name *Uca mordax* also belongs to the present species. The Leiden Museum possesses a specimen from Trinidad (Lavantille Swamp, S. of Port of Spain, bank of a canal in mangrove swamp; 21 November 1953; G. F. Mees), and two from Tobago (Lambeau River near the sea coast; 15 January 1955; P. Wagenaar Hummelinck no. 656A).

Occurrence in Suriname. The species was found together with *Uca rapax* and *U. mordax* in the muddy estuarine region of Suriname. It seems to penetrate farther inland than *U. rapax*. Without reexamination, the identity of the Suriname *Uca* material which Thompson in 1901 reported upon as *Gelasimus vocator* will remain doubtful; at that time, namely, several species of the genus were confused under the specific name *vocator*.

***Uca (Minuca) cumulanta*** Crane, 1943 (textfig. 68a; pl. XIV fig. 3, pl. XV fig. 4)

Museum Leiden

Eastern shore of the mouth of the Suriname River near Braamspunt; mud; 5 April 1957; L. B. Holthuis no. 1219. — 2 males, 2 females.

Paramaribo; 1911; W. C. van Heurn. — 1 male.

Description. Crane, 1943, p. 42, textfigs. 1G-I, pl. 1 figs. 3, 4.

Remarks. This is the smallest of the six species of *Uca* now known from Suriname. The above mentioned males have the carapace breadth between 11 and 12 mm, the females between 9 and 10 mm. The breadth of the front is less than  $\frac{1}{3}$  of the anterior breadth of the carapace. The denticles on the lower orbital margin are very distinct externally, inconspicuous in the inner part of the margin. The large chela of the male differs from that of the male of the other species in that the upper marginal carina of the carpal cavity is merged with the upper margin of the palm and does not curve downwards. The oblique ridge which on the inner surface of the palm extends from the lower margin of the chela towards the carpal cavity bears a single row of large tubercles; this row, after reaching the carpal cavity, turns upwards and continues along the margin of the cavity till it almost reaches the upper margin of the palm. The two rows of tubercles on the inner surface of the

palm near the base of the dactylus meet each other under a distinct angle; the anterior row is very short. The tip of the fixed finger is single or slightly bifid. The walking legs have the posterior surface of their segments smooth; neither in the male nor in the female is there a velvety pubescence on these segments, though there are several small tufts of bristles. The meri of the fifth legs are rather broad. The first pleopods of the male show a tooth on the anterior margin at some distance below the top, which itself is rather blunt (fig. 68a).

Type locality. Pedernales, Venezuela.

Distribution. The species is only known from Venezuela and Suriname.

Occurrence in Suriname. The Braamspunt specimens were collected on an exposed mud flat of very soft mud on the bank of the Suriname River. The species is now for the first time reported from Suriname.

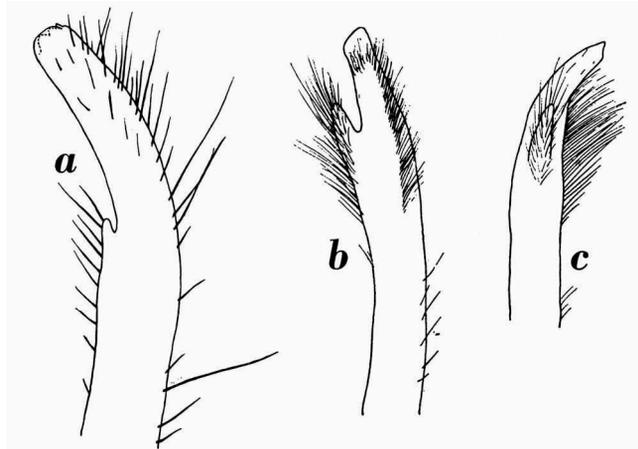


Fig. 68. *Uca cumulanta* Crane. a, top of right first pleopod of male in outer lateral view. *Uca thayeri* Rathbun. b, top of right first pleopod of male in outer lateral view; c, the same in anterior view. a,  $\times 40$ ; b, c,  $\times 12$ .

***Uca (Minuca) thayeri*** Rathbun, 1900 (textfig. 68 b, c; pl. XVI)

Museum Leiden

Shore of Matappica Canal near its mouth; mud; 15-30 August 1957; A. C. J. Burgers. — 2 males, 2 females.

Description. Rathbun, 1918, p. 406, textfig. 169, pl. 144.

Remarks. The above mentioned specimens, which served Dr. Burgers for his experiments on the eye stalk hormones of *Uca*, are in a good condition but for the fact that the eyes have been removed. The males have cb. 29 mm, in the females the cb. is 24 and 30 mm.

The species differs from the other Suriname representatives of the subgenus *Minuca* Bott in that the front is narrowly trapezoid, measuring at its base less than  $\frac{1}{5}$  of the carapace breadth. The carapace in both males and females shows a pubescence which resembles that of the males of *Uca vocator*, but as a rule is more evenly distributed over the carapace. The surface of the carapace in the males is finely shagreened all over, more coarsely so in the anterior part than in the posterior. In the females this shagreen is less conspicuous, it is even absent from the central part of the carapace.

The denticles on the lower orbital margin are very distinct throughout. The suborbital region is naked.

The large chela of the male has the fixed finger straight and tapering at the top, which is practically simple; there is only a faint indication of two tubercles next to the tip. The lower margin of the palm is distinctly carinate. The oblique ridge on the inner surface of the palm bears a single row of large and distinct tubercles, which, when attaining the carpal cavity, curves upwards and follows the margin of this cavity. The dorsal marginal carina of the carpal cavity runs practically parallel to the upper margin of the palm, deviating only slightly downwards in its distal part. In this way it only indicates the upper and not the anterior margin of the cavity. The two rows of tubercles near the base of the dactylus are distinct and run parallel. The walking legs have the meri unusually broad; in the males of *U. thayeri* the meri are about as broad as those of the females of *U. rapax*, while those of the females of *U. thayeri* are still broader. The walking legs of the males of *U. thayeri* have the upper part of the merus, carpus and propodus with a distinct velvety pubescence; the lower part of the propodus is naked and smooth. In the females this pubescence is even more dense and in the propodus it reaches to or almost to the lower margin.

The male pleopod is figured here. It is characterized by having a process on the anterior margin and by the truncated tip. It agrees with Bott's (1954, fig. 5) figure of this organ.

Type locality. Mouth of Rio Paraíba at Cabedelo, Paraíba State, N. E. Brazil.

Distribution. West Indies (Jamaica, Puerto Rico, Curaçao), Suriname, Brazil (north and east coast S. to Espiritu Santo State); also reported from the American Pacific coast (El Salvador). The Rijksmuseum van Natuurlijke Historie possesses a female specimen from Piscadera Bay, Curaçao (28 January 1957, L. B. Holthuis no. 1071).

Occurrence in Suriname. The species is now reported for the first time from Suriname, where it evidently lives in the same habitat as *Uca rapax*. Among the thousands of specimens of the latter species collected by Dr.

Burgers only four specimens of *U. thayeri* were found. This checks very well with my experience with this species in Curaçao. There, in a mudflat behind a mangrove fringe along the shore of Piscadera Bay, numerous *Uca* were observed, the majority (several thousands of specimens) belonged to *Uca rapax* (Smith), also *Uca speciosa* (Ives) was rather common there, but less frequent than *U. rapax*, the third species was *Uca major* (Herbst) (= *U. heterochelos* (Lamarck)), which was quite rare, though at each visit of the mud flat several specimens could be observed. Of *Uca thayeri* a single female was collected, and though the mudflat was practically daily visited and special attention was given to this species, no more specimens were observed there.

#### H. LITERATURE CITED

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## EXPLANATION OF THE PLATES

### Plate I

Figure 1. Suriname River just N. of Kabel (10 April 1957, L. B. Holthuis no. 1236). Typical view of a large river in the interior region of Suriname. Habitat of *Macrobrachium carcinus*, *M. olfersii*, and *Potamocarcinus latifrons*.

Figure 2. Coppename River near its mouth near Boskamp (2 April 1957, L. B. Holthuis no. 1214). Typical view of a large river in the extreme northern part of the coastal region of Suriname. Habitat of *Uca* species, *Sesarma* species, *Goniopsis cruentata*, *Ucides cordatus*, etc.

### Plate II

Figure 1. Ditch along the highway between Paramaribo and Boskamp, at 86 km W. of Paramaribo (2 April 1957, L. B. Holthuis no. 1209). Habitat of *Palaemonetes carteri*.

Figure 2. Bank of ditch in Cocos Polder, Coronie; riddled by the burrows of *Uca* species (11 April 1957, L. B. Holthuis no. 1238).

### Plate III

Figure 1. *Alpheus heterochaelis* Say. Specimen from Braamspunt, 5 April 1957.  $\times 1.7$ .

Figure 2. *Scyllarides americanus* Verrill. Male from "Coquette" Sta. 250.  $\times 0.8$ .

Phot. H. F. Roman

### Plate IV

Figure 1. Ditch near Fishery Service Station "Matappica", seen towards the fish ponds (6 April 1957, L. B. Holthuis no. 1221). Locality where *Merguia rhizophorae* was collected, viz., from under a grass sod from the left hand bank near the mouth of the side ditch.

Figure 2. Same ditch seen from the sluice near the fish ponds.

## Plate V

Figure 1. *Libinia ferreirae* De Brito Capello. Female from 6th voyage of the "Coquette". Natural size.

Figure 2. *Callinectes bocourti* A. Milne Edwards. Male from ditch near Fishery Service Station "Matappica", 6 April 1957.  $\times 0.6$ .

Phot. H. F. Roman

## Plate VI

Figure 1. *Paradasygius tuberculatus* (Lemos de Castro). Male from first voyage of the "Coquette." Natural size.

Figure 2. *Heterocrypta caledoniana* Garth, new species. Oviparous female from third voyage of the "Coquette".  $\times 3$ .

Phot. H. F. Roman

## Plate VII

Figure 1. *Glyptoxanthus vermiculatus* (Lamarck). Male from "Coquette", 19 to 22 July 1957; dorsal view.  $\times 2$ .

Figure 2. Same specimen in ventral view.  $\times 2$ .

Phot. H. F. Roman

## Plate VIII

Figure 1. *Panopeus herbstii* H. Milne Edwards. Female from north coast of Suriname near mouth of Matappica Canal, 6 April 1957.  $\times 1.3$ .

Figure 2. *Eurytium limosum* (Say). Male from Coronie, 23 November 1948. Natural size.

Figure 3. *Pseudothelphusa wymani* Rathbun. Male from Nassau Mts., 1948-1949 Suriname Exped. no. 7957; dorsal view. Natural size.

Figure 4. *Pseudothelphusa wymani* Rathbun. Same specimen in ventral view. Natural size.

Phot. H. F. Roman

## Plate IX

Figure 1. *Pseudothelphusa denticulata* (H. Milne Edwards). Male from Nassau Mts., 1948-1949 Suriname Exped. no. 8365; dorsal view.  $\times 0.9$ .

Figure 2. *Pseudothelphusa denticulata* (H. Milne Edwards). Same specimen in ventral view.  $\times 0.7$ .

Figure 3. *Ocypode quadrata* (Fabr.). Male from beach near the Wia-wia Bank, 1948-1949 Suriname Exped. no. 2618.  $\times 0.9$ .

Phot. H. F. Roman

## Plate X

Figure 1. *Pseudothelphusa colosii* Coifmann. Male from Nassau Mts., 1948-1949 Suriname Exped. no. 8078; dorsal view. Natural size.

Figure 2. *Pseudothelphusa colosii* Coifmann. Same specimen in ventral view. Natural size.

Figure 3. *Pachygrapsus gracilis* (De Saussure). Female from ditch near the Fishery Service Station "Matappica", 6 April 1957.  $\times 2$ .

Phot. H. F. Roman

## Plate XI

Figure 1. *Aratus pisonii* (H. Milne Edwards). Specimen from Matappica Creek near Alliance, 6 April 1957.  $\times 1.3$ .

Figure 2. *Sesarma curacaoense* De Man. Specimen from ditch near the Fishery Service Station "Matappica", 6 April 1957.  $\times 1.4$ .

Figure 3. *Sesarma ricordi* H. Milne Edwards. Specimen from the north coast of Suriname near the mouth of the Matappica Canal, 6 April 1957.  $\times 1.3$ .

Figure 4. *Sesarma rectum* Randall. Specimen from the mouth of the Coppename River near Boskamp, 2 April 1957.  $\times 1.3$ .

Phot. H. F. Roman

## Plate XII

Figure 1. *Cardisoma guanhumi* Latreille. Male from Suriname River near "Purmerend" plantation, Leonsberg; dorsal view.  $\times 0.4$ .

Figure 2. *Cardisoma guanhumi* Latreille. Same specimen in frontal view.  $\times 0.37$ .

Phot. D. C. Geijskes

## Plate XIII

*Uca maracoani* (Latreille). Adult male near entrance of burrow, near Fishery Service Station "Matappica", 7 August 1957.

Phot. A. C. J. Burgers

## Plate XIV

Figure 1. *Uca vocator* (Herbst). Neotype.  $\times 1.2$ .

Figure 2. *Uca mordax* (Smith). Male from Agricultural Experiment Garden, Paramaribo, 21 October 1939.  $\times 1.3$ .

Figure 3. *Uca cumulanta* Crane. Male from Paramaribo, 1911.  $\times 2.4$ .

Figure 4. *Uca rapax* (Smith). Male from the bank of the Suriname River near "Purmerend" plantation, 1 April 1957. Natural size.

Figure 5. *Uca rapax* (Smith). Intersex from 3 km N. of the highway Coronie-Paramaribo, 1948-1949 Suriname Exped. nos. 4413, 4416; dorsal view.  $\times 1.6$ .

Figure 6. *Uca rapax* (Smith). Same specimen in ventral view.  $\times 1.6$ .

Phot. H. F. Roman

#### Plate XV

Figure 1. *Uca vocator* (Herbst). Chela of male from Cocos Polder, Coronie, 11 April 1957; inside view.  $\times 3$ .

Figure 2. *Uca mordax* (Smith). Chela of male from Marowijne River near Galibi, 9 November 1948; inside view.  $\times 4$ .

Figure 3. *Uca rapax* (Smith). Chela of male from Coronie, June 1911; inside view.  $\times 2.8$ .

Figure 4. *Uca cumulanta* Crane. Chela of male from Suriname River near Braamspunt, 5 April 1957; inside view.  $\times 4$ .

Phot. H. F. Roman

#### Plate XVI

Figure 1. *Uca thayeri* Rathbun. Male from Matappica Canal.  $\times 1.4$ .

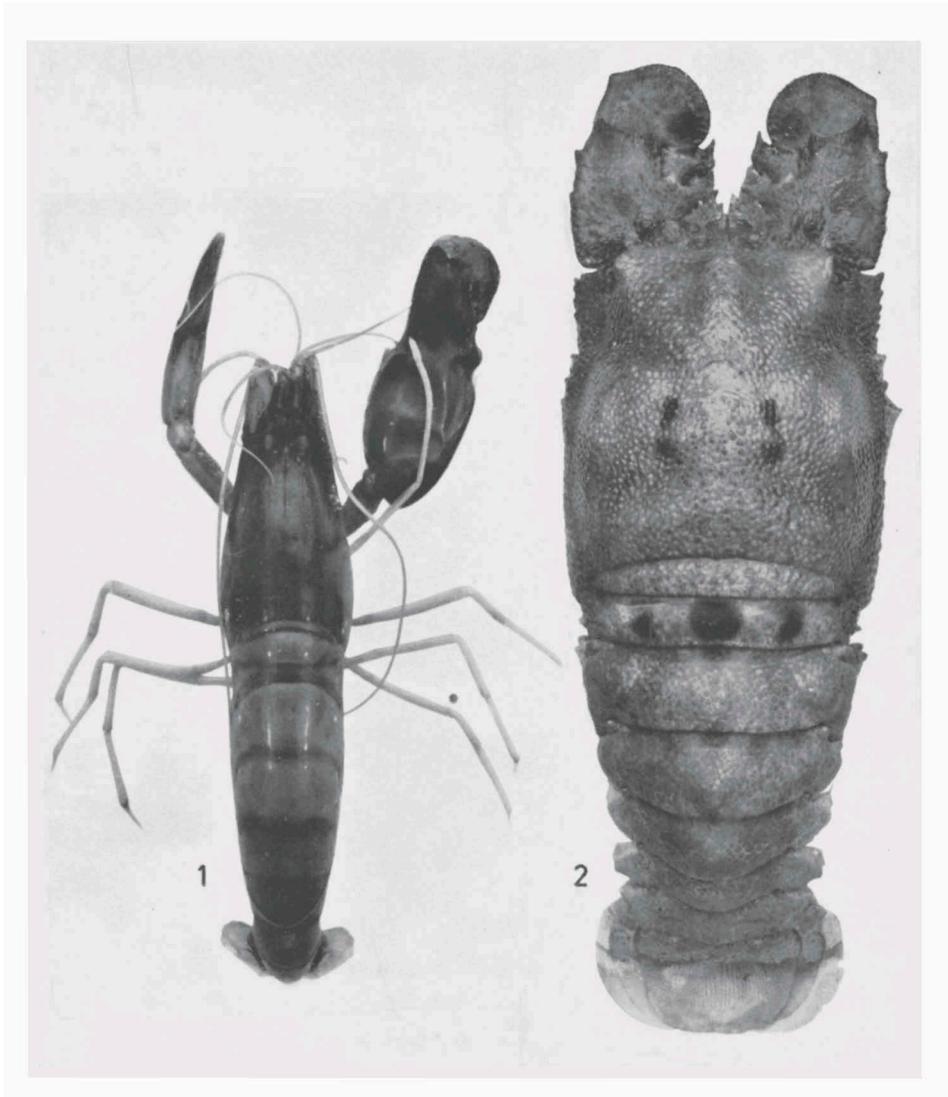
Figure 2. *Uca thayeri* Rathbun. Female from Matappica Canal.  $\times 1.7$ .

Figure 3. *Uca thayeri* Rathbun. Chela of male from Matappica Canal; inside view.  $\times 1.7$ .

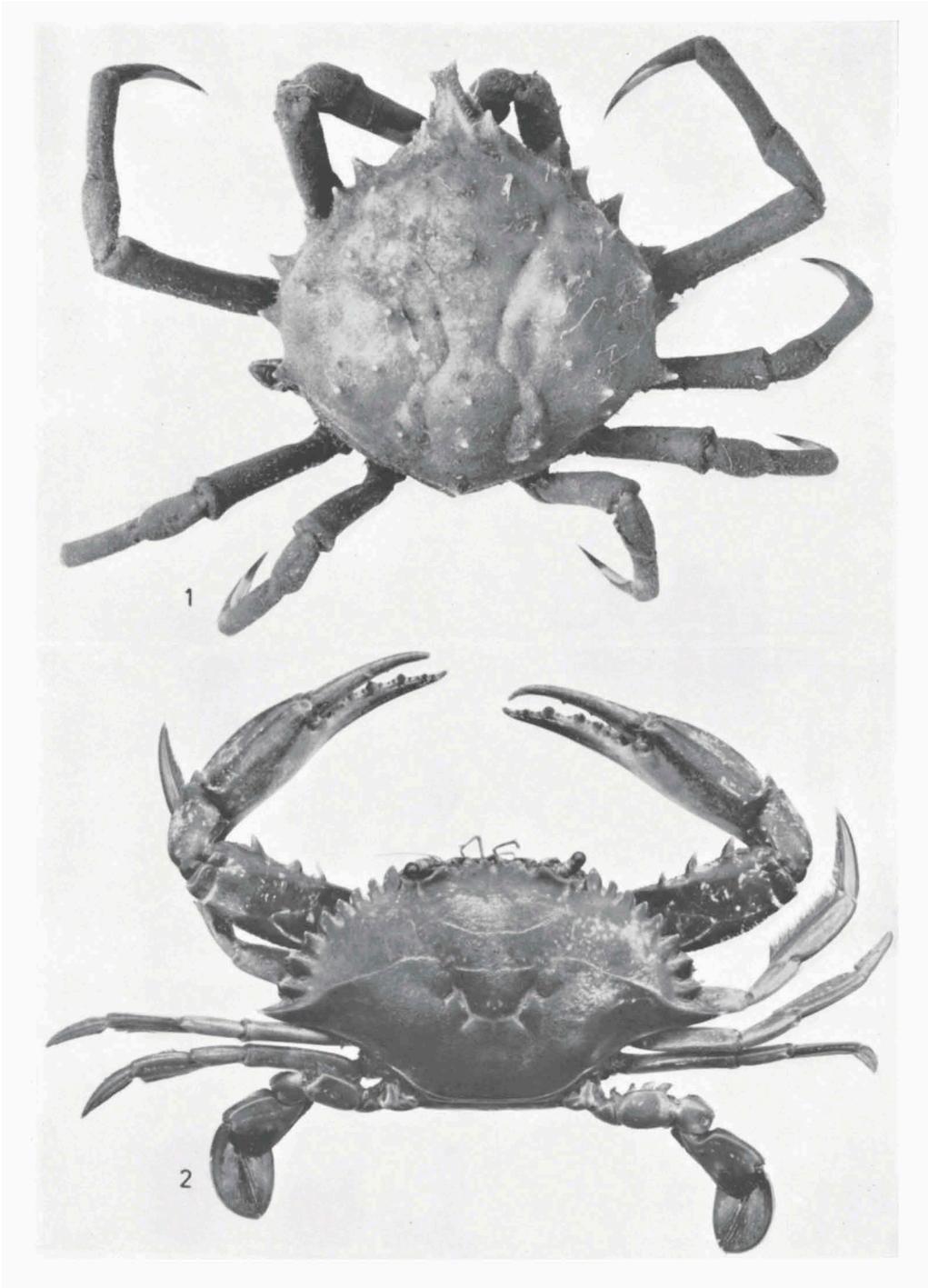
Phot. H. F. Roman

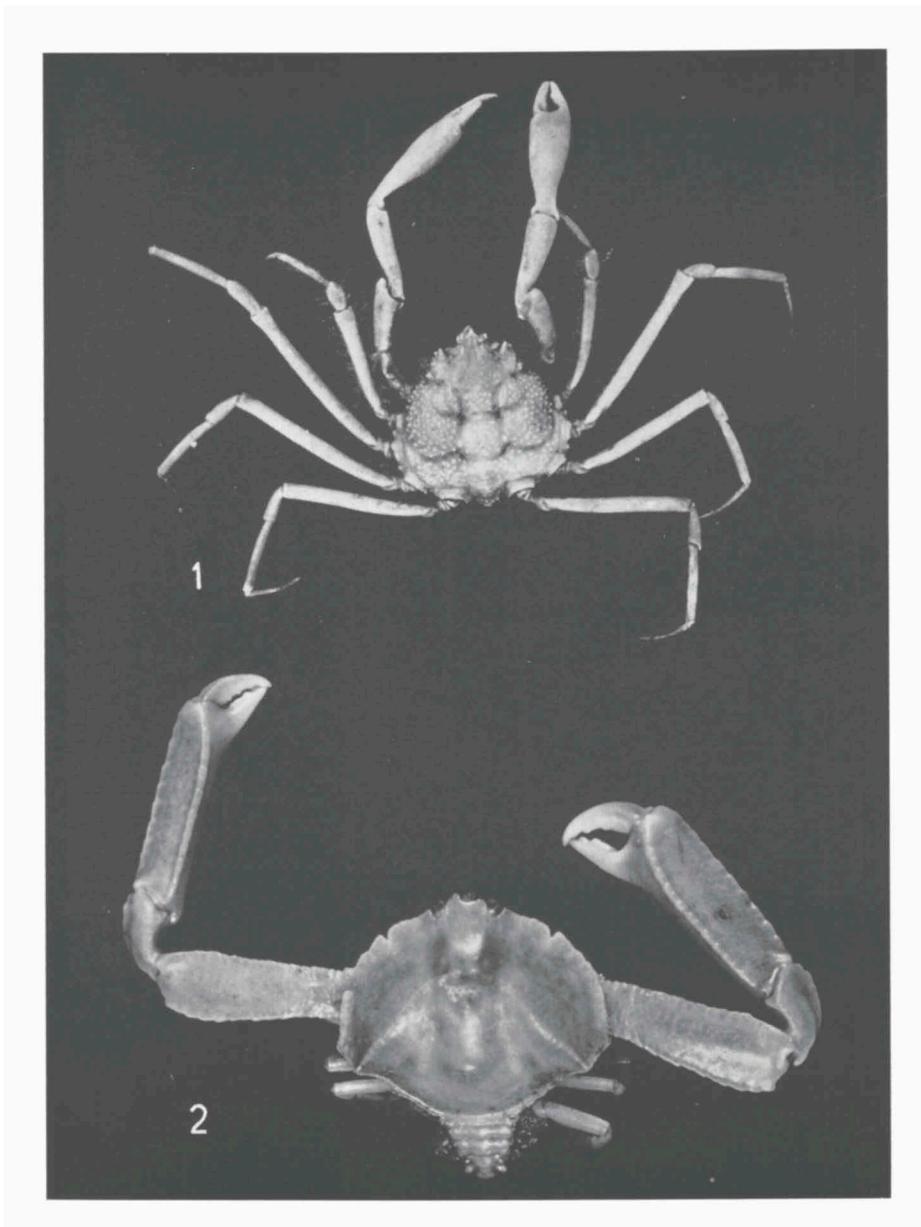


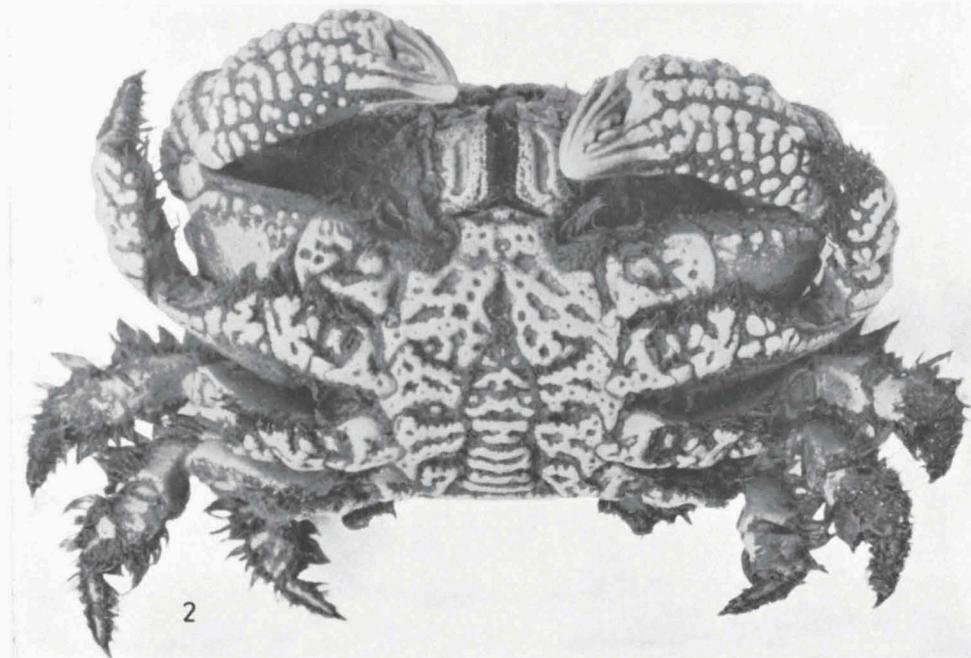
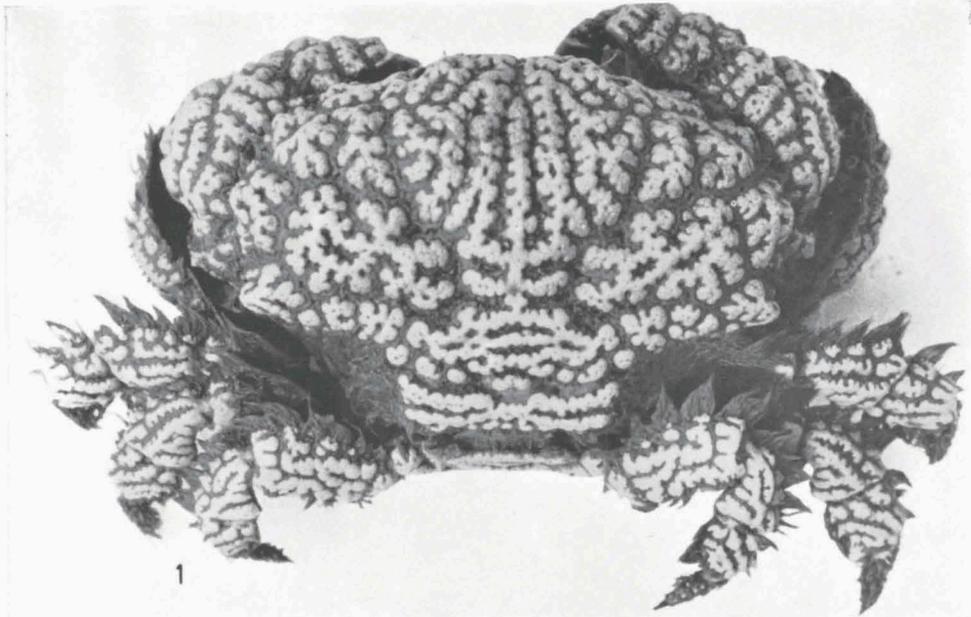


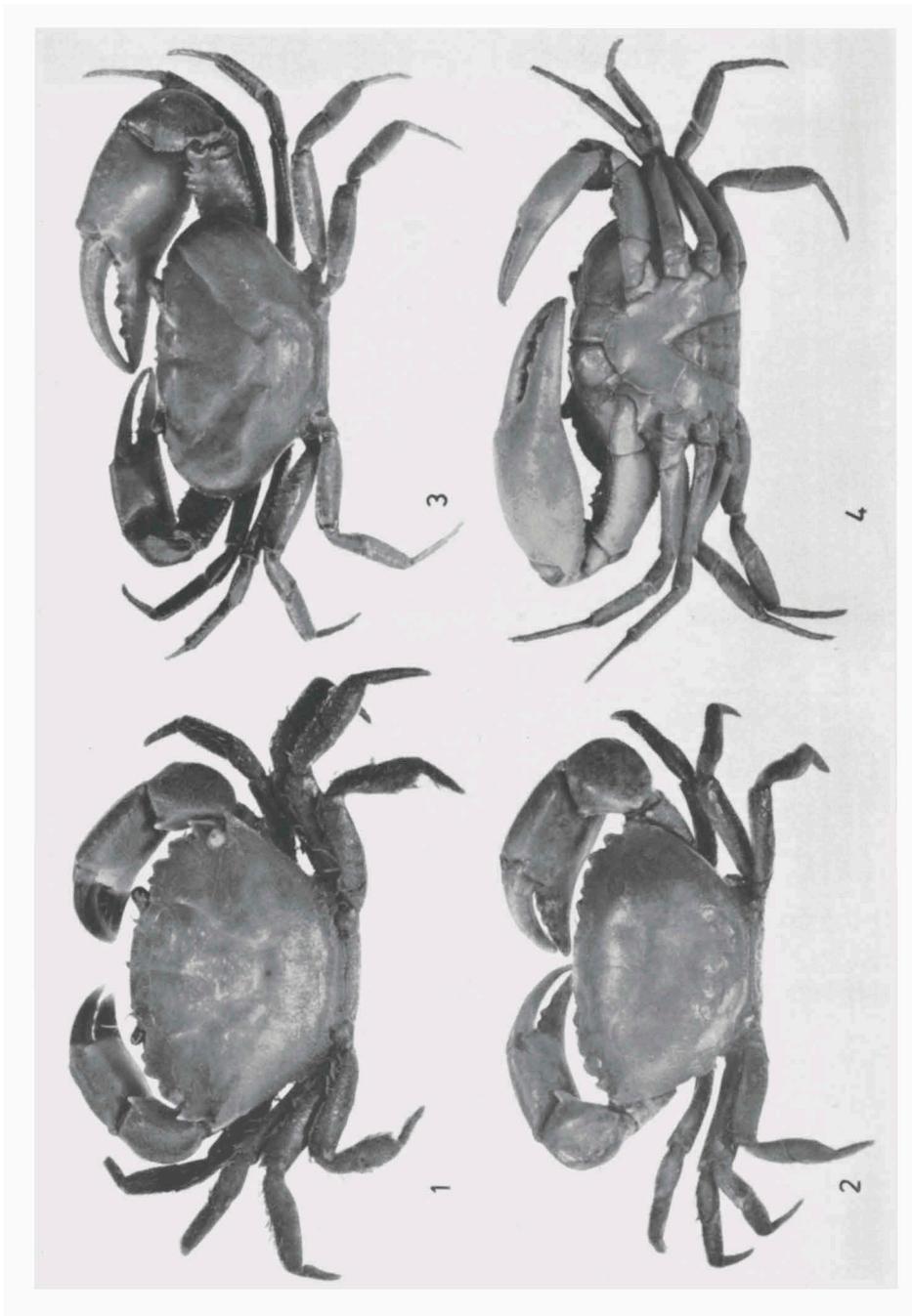


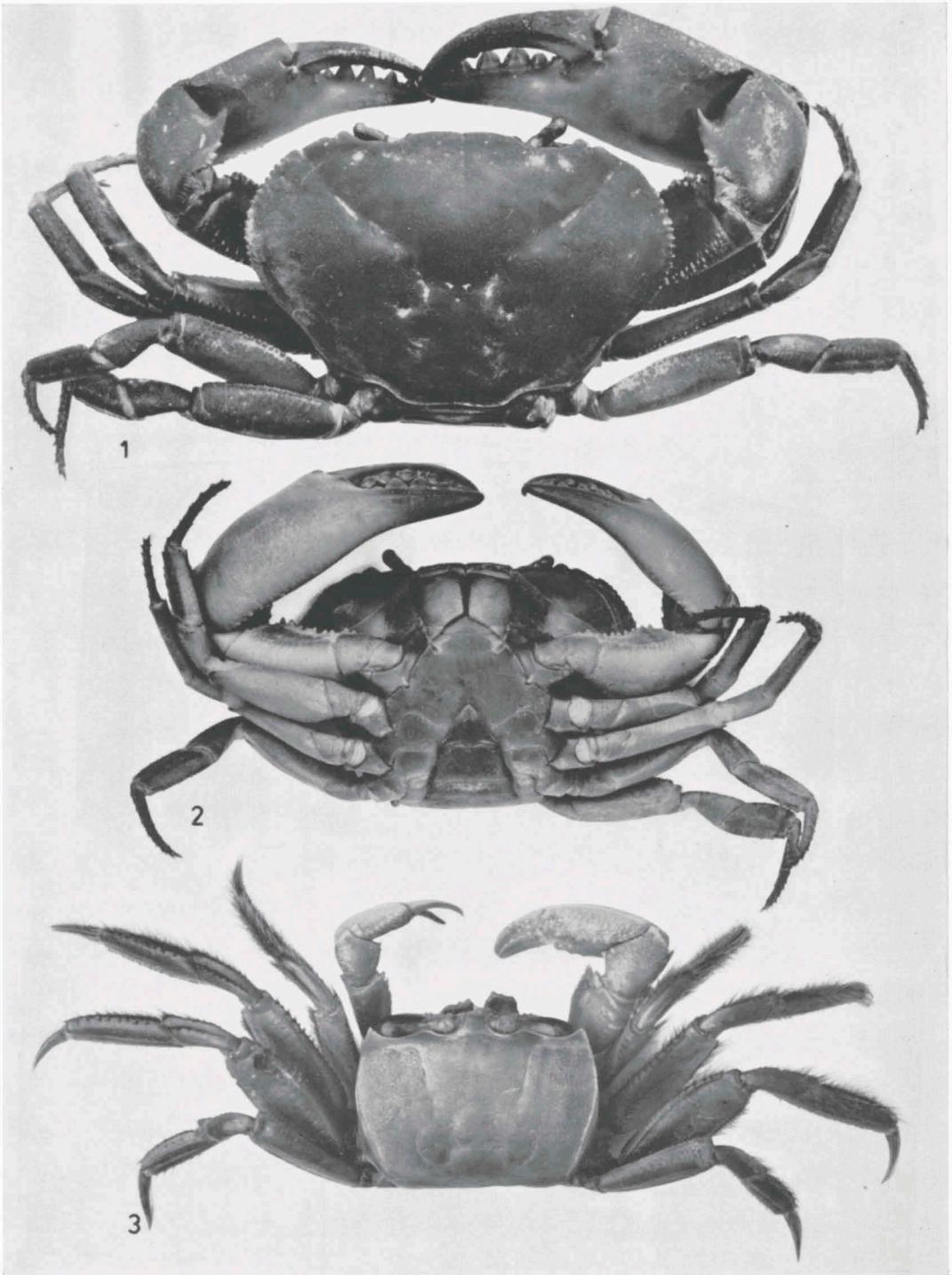


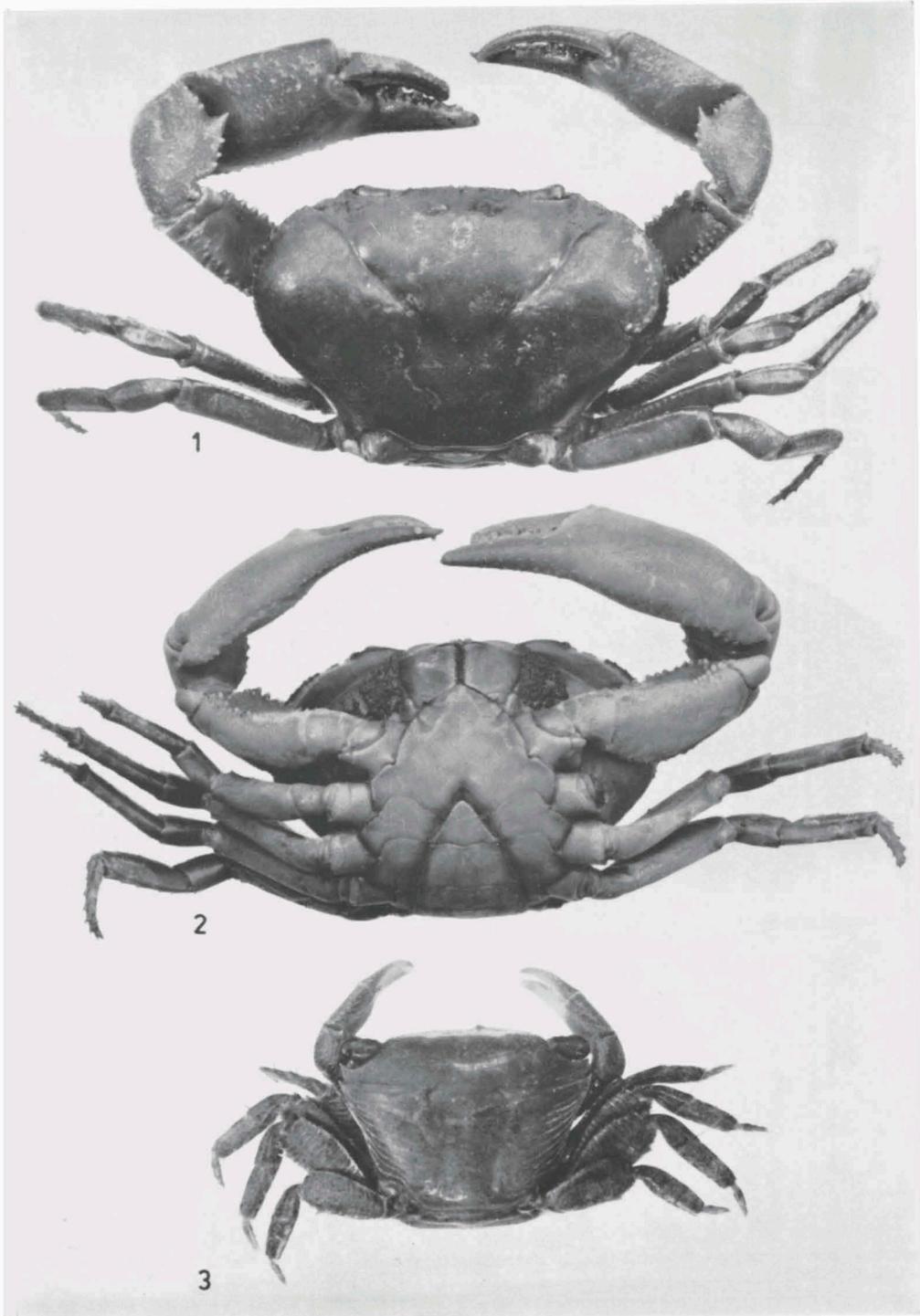


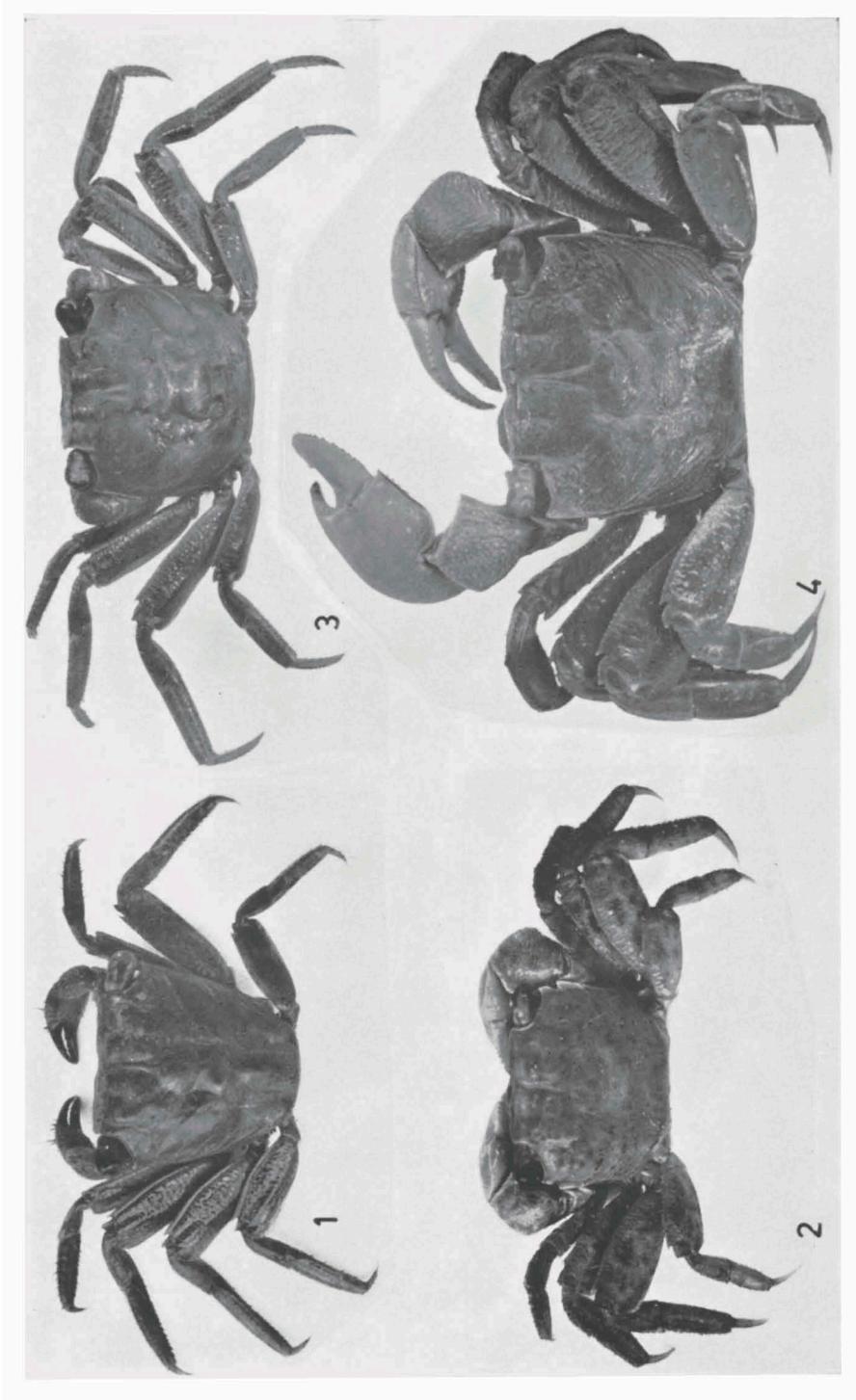


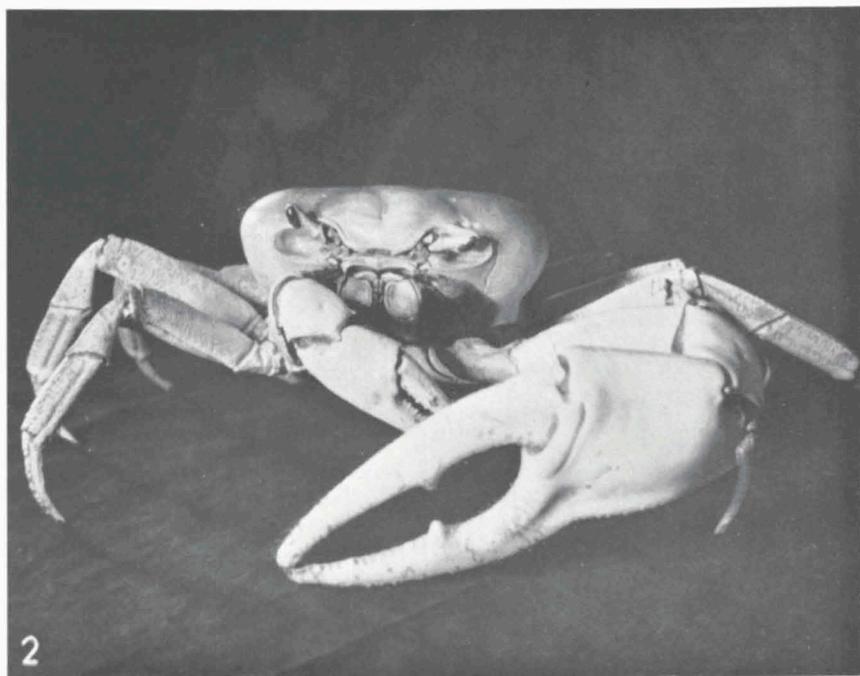
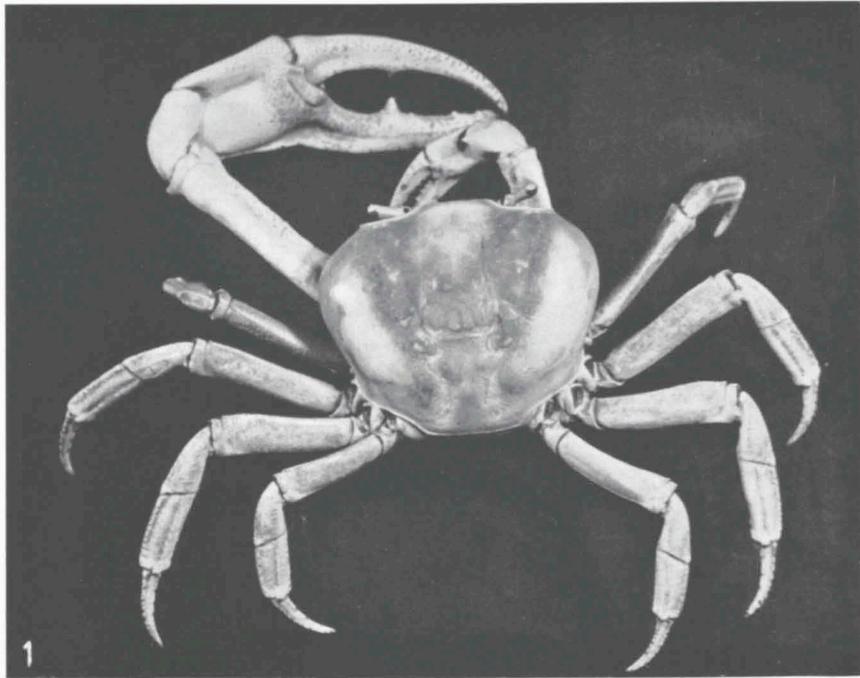


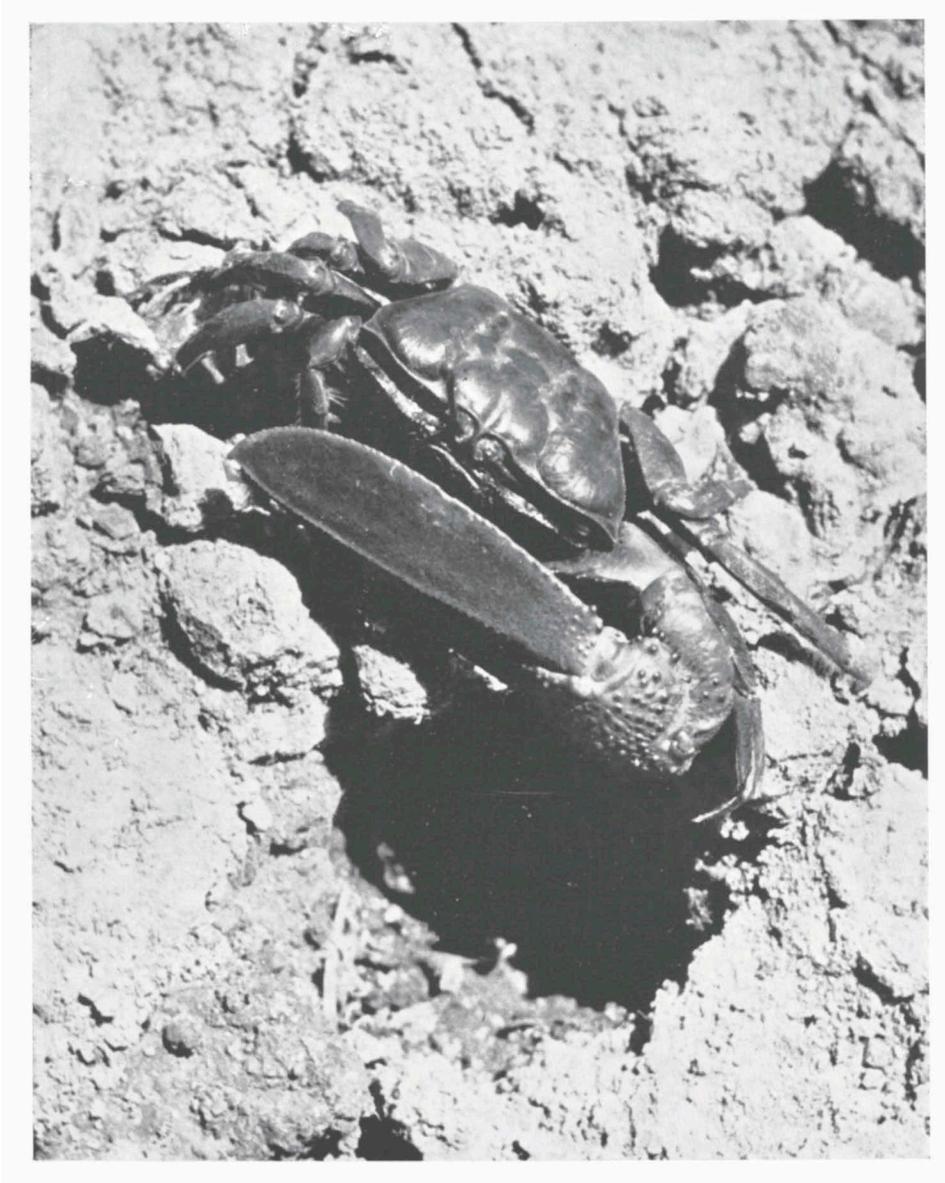


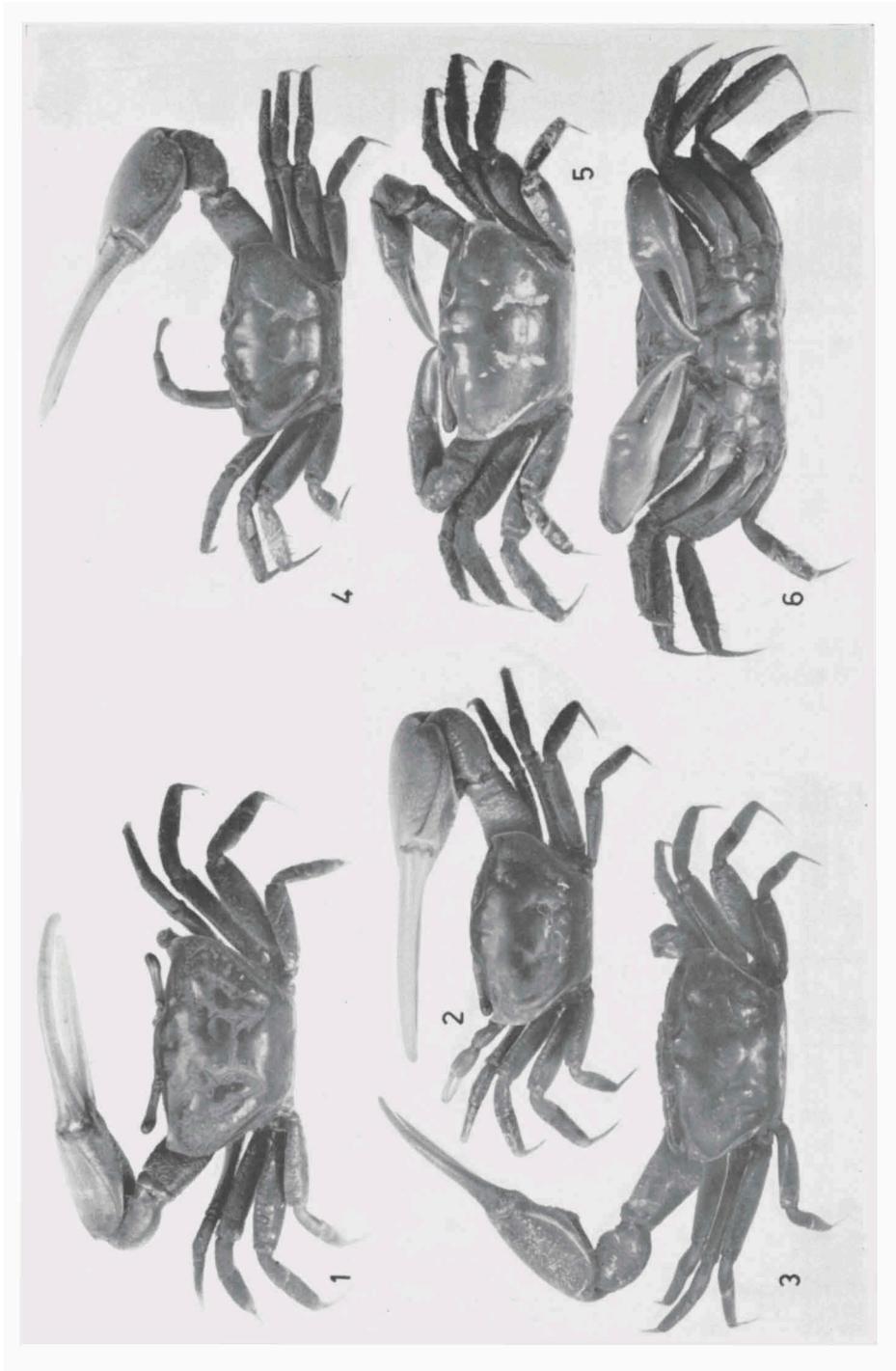


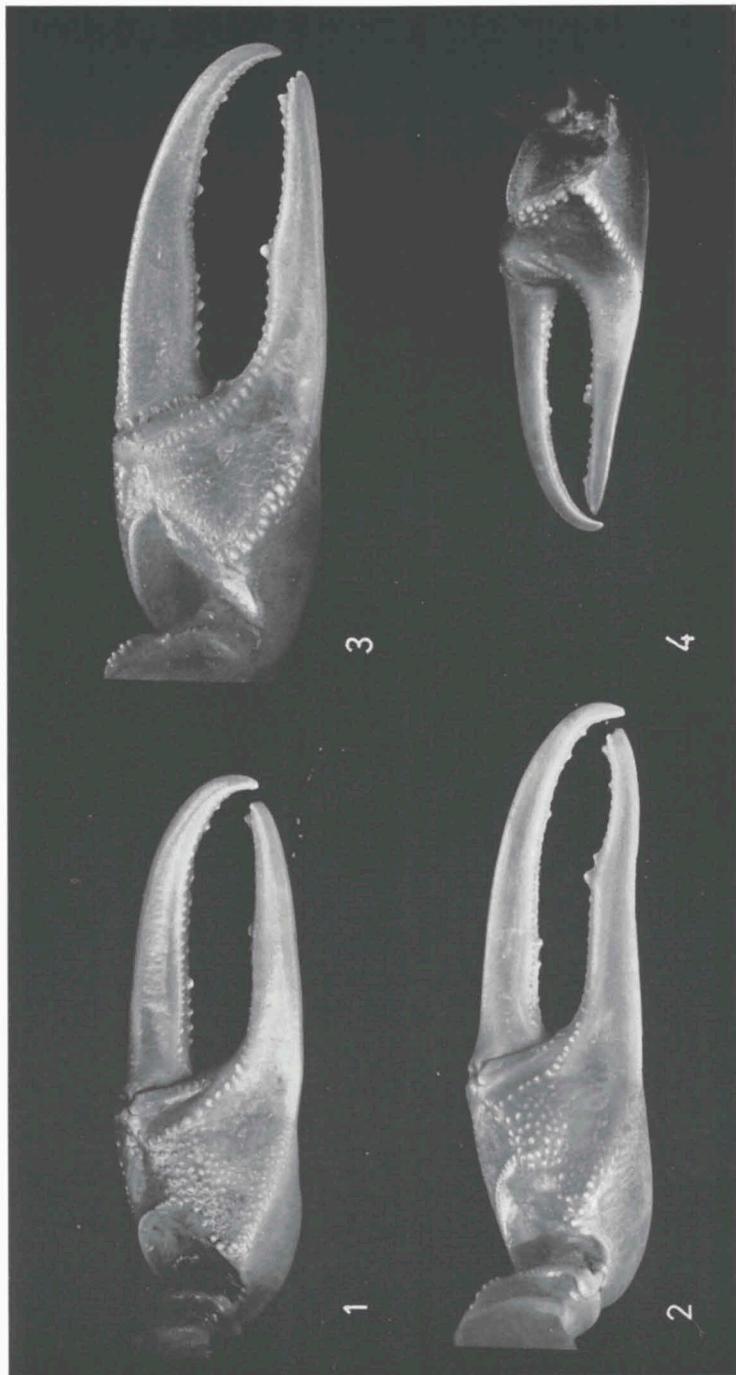


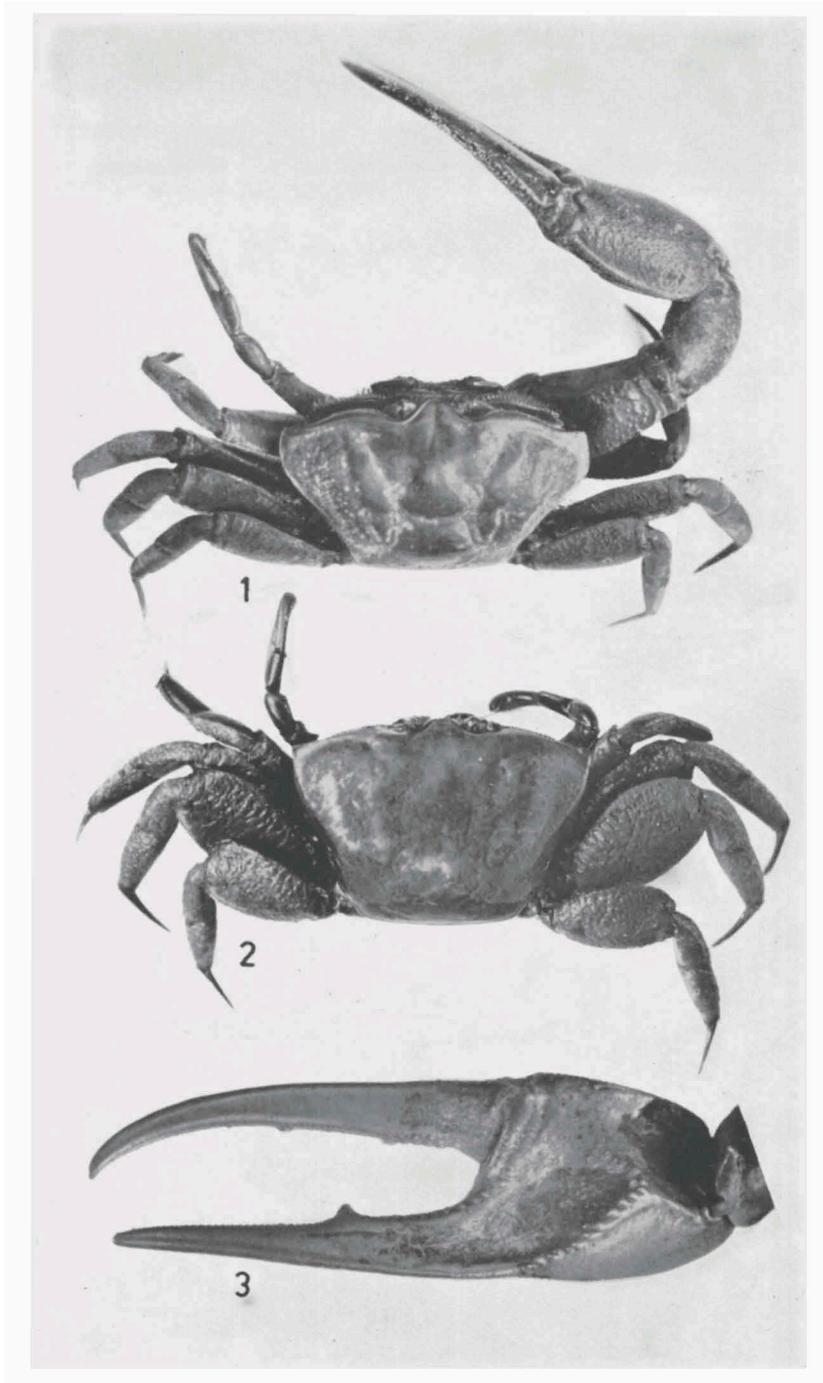


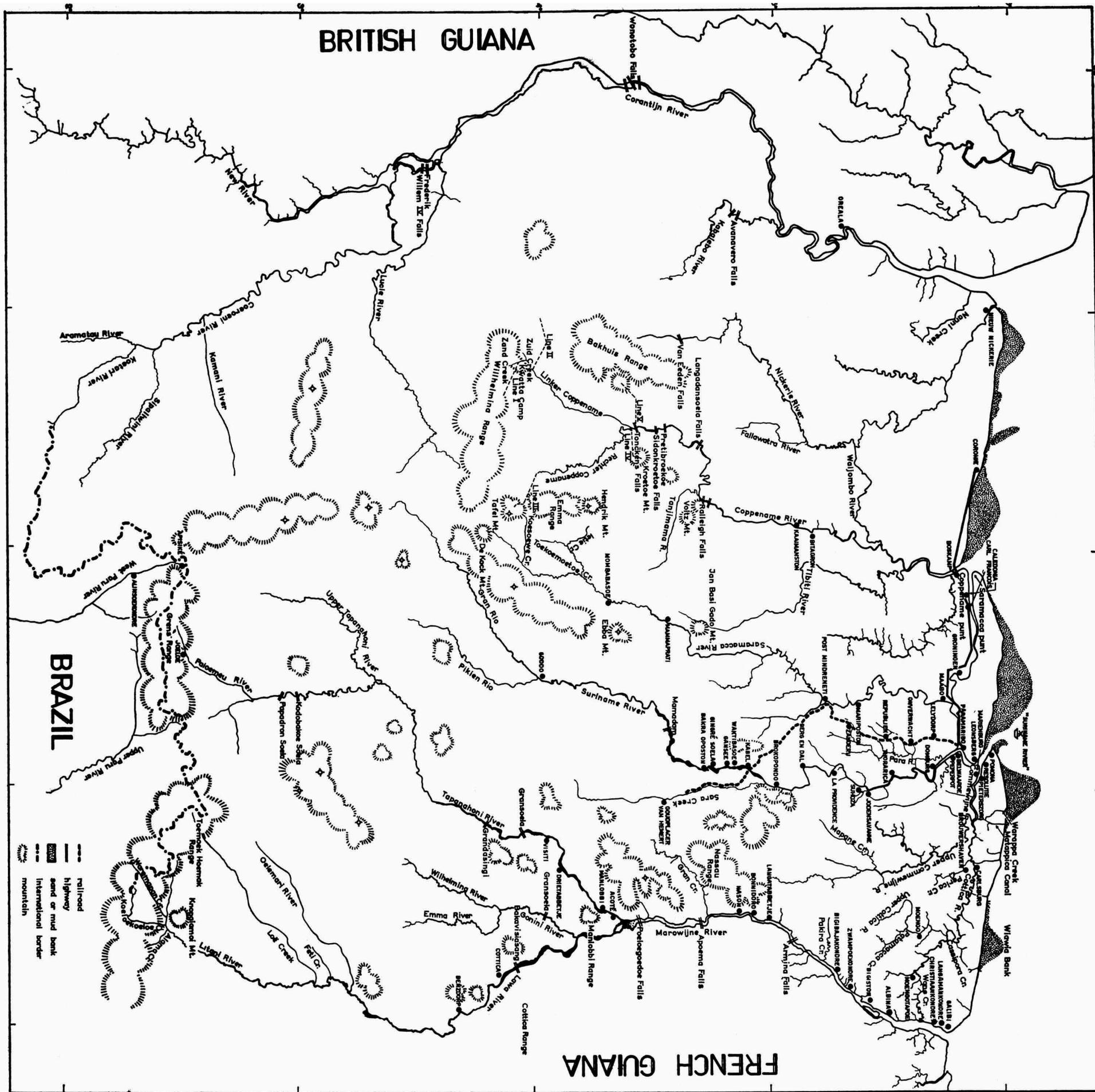




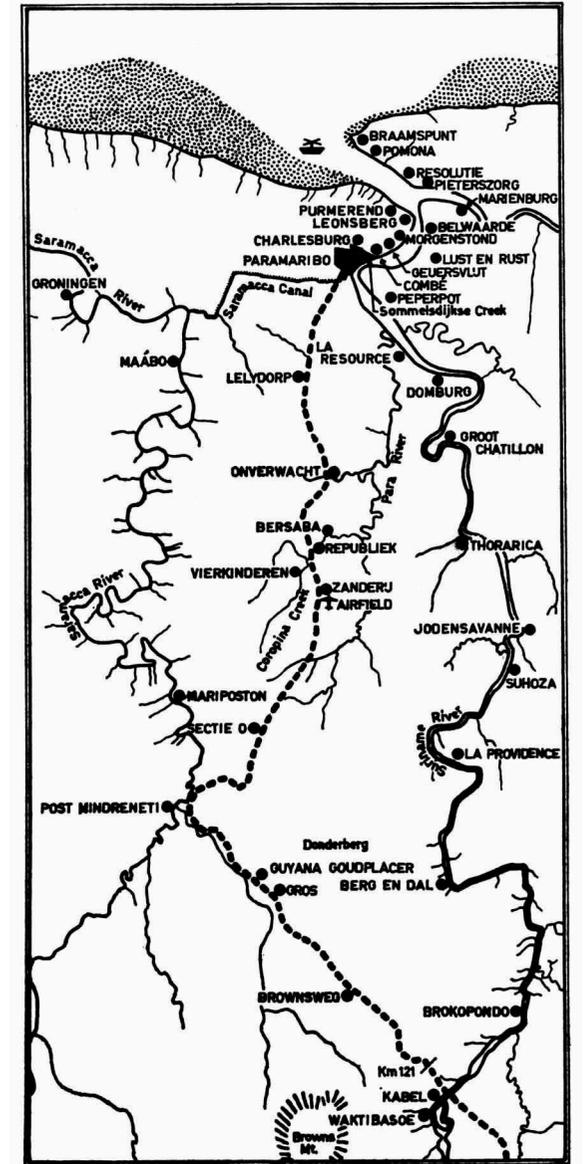








Map 1. Suriname.



Map 2. Coastal region near and south of Paramaribo.