

**ANNOTATIONS ON H. BOSCHMA'S WORK ON
HYDROCORALS (MILLEPORINA, AXOPORINA,
STYLASTERINA), WITH ADDITIONS TO HIS LIST OF
THE DESCRIBED SPECIES OF STYLASTERINA**

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I. INTRODUCTION

An obituary note on Hilbrand Boschma (1893-1976), former director of the Rijksmuseum van Natuurlijke Historie at Leiden, has been published by Vervoort (1977), to which is annexed a complete bibliography of more than 300 titles. Previously a more detailed report on Boschma's research activities in various fields and of his scientific functions had been given by Van der Klaauw (1964) on the occasion of his seventieth anniversary.

Investigation on Hydrocorals has been one of Boschma's main activities during the later part of his life. Between 1948 and 1970 Boschma published 70 papers dealing with the three orders of Hydrocorals: Milleporina, Axoporina and Stylasterina. Milleporina are dealt with in 15, Axoporina in 6, and Stylasterina in 54 papers.

In the order Milleporina Boschma described two new species, *Millepora latifolia* and *M. tuberosa*, and renamed two others, *M. tenera* and *M. tornquisti*, both previously described by other authors under unavailable or incorrect names.

In the new family Axoporidae of the new order Axoporina (elevated to equal standing with the orders Milleporina and Stylasterina), he described *Axoporella kolosvaryi* as the type of the new genus *Axoporella* (later on synonymized by him with *Axopora*).

In the order Stylasterina he renamed one species, *Stenohelia challengerii*, in order to avoid confusion by homonymy in closely related genera (or subgenera according to some authors), and described fifteen new species and one new subspecies: *Allopora blattea*, *A. eguchii*, *Calyptopora reticulata* (type of the new genus *Calyptopora*), *Errina amoena* (= *E. dabneyi* (Pourtalès)), *E. aspera mascarina*, *E. carnea* (= *E. laterorifa* Eguchi), *E. cruenta*, *E. decipiens*, *E. diffusa*, *E. hicksoni*, *E. sarmentosa*, *Gyropora africana* (type of the new genus *Gyropora*), *Stenohelia concinna*, *S. conferta*, *S. robusta*, *Stylaster brunneus*.

His work includes an annotated list of the species of Stylasterina described before 1957, and exhaustive reviews of the minor orders (in number of species) Milleporina and Axoporina.

Boschma's studies are based on an exhaustive analysis of the literature, on world-wide material in the collections of various museums, and on new samples or collections sent to him and obtained by individual scientists and by oceanographic expeditions. Boschma had only few opportunities to collect Hydrocorals himself: during a stay in Indonesia in 1921, during the "Snelius" expedition to the same area in 1929, and on a visit to the reefs of the Fiji islands in 1948. He was in contact with Hjalmar Broch (1882-1969), of Oslo, author of various papers on Stylasterina published from 1914 to 1951, and other scientists active in Hydrocorals.

Visits to museums which provided him with the opportunity to examine large or important collections, are specially referred to in some of his publications: Muséum National d'Histoire naturelle, Paris (1947, 1956), British Museum (Natural History), London (1948, 1957), Museum of Comparative Zoology, Cambridge, Mass. (1961); Yale Peabody Museum, New Haven, Conn. (1961), United States National Museum Washington, D.C. (1961), Bernice P. Bishop Museum, Honolulu, Hawaii (1948).

Nearly all samples received on loan by Boschma or donated to him were orderly listed, with a number, in a register. Occasionally he used these register numbers as "arbitrary numbers" in publications with the object of easy distinction, in addition to the data on locality, collector, etc. Boschma's register

is preserved at the Leiden museum, together with abundant elaborations, published and unpublished, and annotations made on visits to other museums.

2. SUMMARIES OF BOSCHMA'S PUBLICATIONS ON HYDROCORALS

Only few of Boschma's papers contain a summary of the main topics; in addition unexpected informations and various considerations are occasionally included. On the following pages we summarize the main contents of his 70 papers on Hydrocorals. The 'Boschma publication numbers' (BPN) are those used in Vervoort's (1977) chronological list. Detailed references are given in the bibliography at the end of the present note. The letters M, A, S, following the publication number indicate the orders dealt with, Milleporina, Axoporina, Stylasterina, respectively.

BPN 105 M, 1948: Het soortprobleem bij *Millepora*.

Summary of the main topics of a more extensive paper (BPN 108). Criticism of the abusive synonymization by Hickson of all described forms of *Millepora* with *M. alcicornis*; considerations on possible specific characters. Evidence of specific growth forms in colonies of different species growing side by side. Nine species are distinguished by the author.

BPN 108 M, 1948: Specific characters in *Millepora*.

Historical review of the distinction of species in the genus *Millepora*. Considerations on possible distinctive characters such as the general form of growth of the colonies and the size of the pores. Remarks on different species growing side by side, each preserving its typical form of growth under identical environmental conditions. Nine rather well defined species are recognized (*M. alcicornis*, *M. exaesa*, *M. dichotoma*, *M. squarrosa*, *M. complanata*, *M. platyphylla*, *M. intricata*, *M. murrayi*, *M. tenella*), to which most of the others are referred as synonyms.

BPN 110 M, 1948: The species problem in *Millepora*.

Paper subdivided roughly as follows: introduction; historical notes including the successive views concerning the specific value of the growth forms; the species of the genus *Millepora*; synonymy and geographical distribution; discussion on the various characters for specific distinction; notes on specimens from the Java Sea and notes on other specimens in museum collections (Paris, Leiden, Amsterdam). A new species is described from the Java Sea (*Millepora latifolia*), in addition to the nine species previously recognized by the author (BPN 108). An exhaustive list of the literature, since 1758, deals with the recent forms of *Millepora*.

BPN 114 M, 1948: De ampullae van *Millepora*.

Summary of the main topics of a more extensive paper which is specially referred to (BPN 115).

BPN 115 M, 1949: The ampullae of *Millepora*.

Some historical notes on investigations on ampullae precede the author's detailed studies of ampullae in *M. alcicornis*, *M. latifolia*, *M. murrayi*, *M. platyphylla* and *M. tenella*, generally from localities in the Indo-Pacific area, exceptionally from unknown localities. To some extent specific characters may be found in the structure of the ampullae.

BPN 125 M, 1949: Notes on species of the genus *Millepora* in the collection of the British Museum.

The material studied is referred to eight species: *M. alcicornis*, *M. exaesa*, *M. dichotoma*, *M. complanata*, *M. platyphylla*, *M. intricata*, *M. murrayi*, *M. tenera* (= nomen novum for *M. tenella* Ortmann, 1892, preoccupied). Commented additions are made to the synonymies given in the author's previous papers.

BPN 130 M, 1950: Notes on the coral reefs near Suva in the Fiji Islands.

Field observations provide arguments for the distinction of species in the genus *Millepora*, each with its own preference of habitat. On the edge of the Suva reef *M. tenera* is common, with colonies often attaining a large size, contrasting the dwarfed condition of the few colonies observed of *M. platyphylla*.

BPN 141 M: Further notes on the ampullae of *Millepora*.

The ampullae studied in detail are those of *M. alcicornis* and *M. platyphylla*, respectively from the West Indies and from the Indo-Pacific area. Various other specimens previously examined by the author are again mentioned. Further notes include some additional specimens of *Millepora* from the Pacific (Bernice P. Bishop Museum, Honolulu, Hawaii).

BPN 152 M, A, S, 1951: Notes on Hydrocorallia.

1. The introduction chiefly summarizes the views concerning the affinities of Milleporina and Stylasterina with the Hydroidea.

2. The fossils commonly regarded as species of the genus *Millepora* are analyzed from literature. Amongst these *M. tornquisti* (new species established for *M. cylindrica* sensu Tornquist, 1905, Eocene of Madagascar) appears to be the only characteristic representative of *Millepora*. The attribu-

tion to *Millepora* of eight other forms is here considered doubtful if not unjustified; some appear to be Bryozoans, while for others the position in the zoological system is completely uncertain.

3. Though some resemblance may be noted with the Stylasterine genus *Pliobothrus*, the fossil genus *Milleaster* appears closely related to *Millepora*. Constant characters for a generic distinction are not easy to find.

4. Some genera and species described as Milleporidae or regarded as closely allied forms are to be eliminated from this group: *Arachnopora argentea* and *Millepora undulosa*, both recent from New Zealand (Bryozoa?), and the fossil genera *Millestroma*, *Milleporidium*, *Promillepora*, *Thaumatostroma* (incertae sedis — Stromatoporoidea?).

5. The family name Axoporidae is proposed for the closely allied fossil genera *Axopora* and *Diamantopora*. The type species of *Diamantopora* and several species of *Axopora* are analyzed from literature. *Millepora mammilosa* is referred to *Axopora*.

6. The fossil genera *Aphyllacis*, *Cylindropora* and *Palassopora* are considered to be erroneously placed in the Stylasterina. The affinities of *Aphyllacis* appear to be with the Bryozoa, while the affinities of the others are more doubtful.

7. The last part contains notes on true Stylasterina. The affinities of a few fossil species ascribed to *Stylaster* are discussed. The recent Pacific species *Stylantheca porphyra* is regarded as the type of a separate group of at least subgeneric value and of the same status as *Allopora* with respect to *Stylaster*. The fossil genus *Congrepora* is shown to be similar to *Conopora*. Examination of the type of the recent *Endohelia japonica* allows for the transfer of this species to the genus *Crypthelia*, with *Endohelia* as a synonym.

BPN 153 S, 1951: Notes on Stylasterina (Hydrocorallia).

1. *Stylaster elegans* Verrill, from the Pacific, has priority over *Stylaster elegans* Duchassaing & Michelotti, from the West Indies. The latter name is to be rejected as a homonym and should be replaced by the next oldest available name, *Stylaster duchassaingii* Pourtalès, which has priority over *Stylaster eximius* Kent.

2. The fossil species *Deontopora mooraboolensis* from Australia, type species of the genus *Deontopora*, has characters of common occurrence in the genus *Stylaster*. Consequently *Deontopora* is synonymous with *Stylaster*.

3. After a review of all the available data it is concluded that the fossil Stylasterine genus *Cryptaxiella* Kühn (= *Cryptaxis* Reuss) is synonymous with *Allopora*, and that the species *Cryptaxiella alloporoides* (Reuss) (= *Dendracis compressa* Römer) should be named *Allopora compressa* (Römer).

4. Remarks on the origin of the type material of *Crypthelia pudica* and on additional records of the species. Moseley confused a distinctly different species of *Crypthelia* with *C. pudica*. For this species from the Challenger Expedition the name *Crypthelia affinis* is available, used by Moseley in the legend of a plate. This name has priority over *Crypthelia moseleyi*, proposed by Hickson & England.

5. Since *Stylaster*, *Allopora* and *Stenohelia* are frequently considered subgenera of one genus (*Stylaster*), there would be homonymy of *Allopora profunda* Moseley and *Stenohelia profunda* Moseley. Consequently it is proposed to replace *Stenohelia profunda* by *S. challengerii* nomen novum.

BPN 154 S, 1951: On a specimen of *Distichopora brasseyae* Wright (Hydrocorallia, Stylasterina).

A big colony identified with *D. brasseyae* from the Gilbert Islands is compared with specimens of *D. nitida* and *D. coccinea* (both Gilbert Islands) and of *D. violacea* (Red Sea, Java, Celebes). The previous literature on *D. brasseyae* and *D. allnutti* (the latter considered as synonymous of the former) is quoted extensively. Boschma largely refers to views of Fisher and Broch concerning the synonymy of the species of the genus *Distichopora* (*D. violacea* = *D. nitida* = *D. coccinea*) but he considers *D. brasseyae* a distinct species.

BPN 164 S, 1953: Over enkele noorsche Korallen.

Annotated synonymy of the two species of Stylasterina occurring in Norwegian waters: *Allopora norvegica* (Gunnerus) and *Stylaster gemmascens* (Esper). In the older literature there has been some confusion of *A. norvegica* with *Errina aspera* (a Mediterranean species) and of *S. gemmascens* with *Oculina virginea* (a Scleractinian). The name *Madrepora gemmascens* Wilkens, used for a Scleractinian probably identical with *Oculina infundibulifera* Lamarck, should be rejected by the International Commission on Zoological Nomenclature.

BPN 165 S, 1953: Linnaeus's description of the Stylasterine coral *Errina aspera* I, II.

Review of the older literature (including Linnaeus) on *Errina aspera*, a Mediterranean species, sometimes erroneously reported from Norway. Reproduction of old texts and figures dealing with *E. aspera* and forms erroneously referred to it (mainly Bryozoans).

BPN 168 S, 1953: Notes on specimens of *Stylaster mooraboolensis* (Hall) in the collection of the Manchester Museum.

Deontopora mooraboolensis, an Eocene fossil from Australia, is a typical representative of the genus *Stylaster* into which the genus *Deontopora* has to be included as a synonym. Specimens of the fossil species are compared in detail with recent material from Indonesia (Siboga Expedition) described by Hickson & England as *Stylaster eximius* facies *minor*, *irregularis* and *dentatus*. These Indonesian forms are probably not specifically identical with the West Indian species *Stylaster eximius* (the latter to be referred to as *Stylaster duchassaingii*, older available name, BPN 153).

BPN 169 S, 1953: The Stylasterina of the Pacific.

Extensive review of the literature on Stylasterina in the Pacific area, no new data. A total number of 127 species and forms are listed and their occurrence in one or more of the 24 regions distinguished in this paper is recorded. The fossil Stylasterina described from countries bordering the Pacific are included. The fauna of each of the 24 regions is discussed separately. The taxonomical changes chiefly concern the transfer of certain species from one genus to the other because of evident characters noted in the original description. The data compiled should not be considered final as far as conclusions on occurrence and distribution of Stylasterina in the Pacific area are concerned because a number of the published records need confirmation before they may be regarded as established facts. In particular doubts are expressed with regards to the occurrence of Atlantic species in the Pacific.

BPN 172 S, 1954: Stylasterina in the collection of the Amsterdam Museum. I. *Errina aspera* (L.).

Description of a colony from the Mediterranean in the old collection of the museum. cursory review of the literature on *Errina aspera* and on various other species of the genus *Errina*. Indications for the occurrence of *E. aspera* in other localities than the Mediterranean are considered highly uncertain. Considerations on the subdivision of the genus *Errina* as proposed by Hickson and by Broch.

BPN 174 A, 1954: De familie Axoporidae.

The characters of the fossil Hydrocoralline genus *Axopora* are summarized from the literature, and the new genus *Axoporella* is established. The type species *Axoporella kolosvaryi* (lower Eocene of Hungary) has a colony-structure like *Axopora* and its gastrostyles are covered over the whole of their length with small spines, whereas the gastrostyles of *Axopora* are said to be fasciculate and devoid of spines.

BPN 182 S, 1955: The type specimen of *Stylaster gemmascens* (Esper, 1794).

Description of a specimen in Esper's collection which is here considered type¹⁾ material of *S. gemmascens* (in the meantime transferred from Erlangen University to the Senckenberg Museum, Frankfurt). It belongs to a species well-known from the North Atlantic, especially from Norway. Esper's indication that it is an East Indian species is considered erroneous. Material from Indonesia (Siboga Expedition) originally ascribed to *S. gemmascens* by Hickson & England belongs to a different species.

BPN 195 S, 1955: The specific characters of the coral *Stylaster roseus*.

Description of colonies from shallow water at Curaçao. *S. roseus* is a West Indian shallow water species well recognizable in some 18th century descriptions and figures. In later years these older data were overlooked and the name *S. roseus* was occasionally given to corals which in reality belong to *Stylaster erubescens*, a deep-water species from the West and North Atlantic.

BPN 196 S, 1956: Stylasterina in the collection of the Paris Museum I. *Distichopora gracilis* Dana.

Description of *D. gracilis* after many colonies from shallow water at Hao Island (Tuamotu Archipelago, South Pacific). *D. gracilis* appears to be a good species, notably different from *D. serpens*, *D. violacea* and various other species (*D. coccinea*, *D. nitida*) synonymized by various authors with *D. violacea*.

BPN 197 S, 1956: The Stylasterine coral *Allopora incompleta* Tenison-Woods.

Redescription of *A. incompleta* after material from Queensland and New South Wales (fragments of the holotype included). Discussion on the resemblance of *A. incompleta* with other species of *Allopora* and *Stylaster*, characterized by incomplete cyclosystems, especially with *S. duchassaingüi*, a species originally described from the West Indies and later on reported from the Indo-Pacific region (including remarks on its synonymy). *Stylaster sanguineus* sensu Hedley, 1903, from New South Wales, host of the Gastropod *Pedicularia stylasteris*, is identified with *A. incompleta*.

BPN 198 S, 1956: Notes on the Stylasterine coral *Allopora nobilis* Kent.

Redescription of *A. nobilis* from South Africa after specimens in the

¹⁾ In a later publication (BPN 213) this specimen is referred to as Esper's holotype and is selected lectotype of *Madrepora gemmascens* (= *Stylaster gemmascens*) Esper.

collections of the Manchester, Leiden and Paris museums. Remarks on the synonymy; comparison with other species of the genus *Allopora*, especially with *A. californica* (fragments of holotype figured).

BPN 200 S, 1956: Stylasterina in the collection of the Paris Museum II. *Errina amoena* nov. spec.

Description of the new species *E. amoena* after a large, fan-shaped colony in the Paris Museum said to come from the China Sea. Comparison with *Errina aspera*; remarks on some other species of *Errina*, including *E. dabneyi* from the Azores, a species apparently similar to *E. amoena*. Considerations on the subgeneric divisions of *Errina* as proposed by Hickson and Broch.

BPN 201 M, A, S, 1956: Milleporina and Stylasterina (In: R. C. Moore, Ed., Treatise on Invertebrate Paleontology).

An introduction on the various conceptions of the systematic position and affinities of Milleporina and Stylasterina is followed for each order by a study of the morphological features (soft and hard parts), the occurrence (geographic, bathymetric, stratigraphic) and the systematic description of all genera. The chapters on both Milleporina (including the family Axoporidae) and Stylasterina are supplemented by a list of genera which have erroneously been assigned to these orders.

BPN 204 S, 1957: List of the described species of the order Stylasterina.

The genera are arranged according to the 'apparently natural system' while within each genus the species (recent and fossil) are placed in alphabetical order. About 160 species are listed; the data for each species are compiled as lists of synonyms; misidentifications may be included and only evident errors are pointed out. For each species the distribution is summarized. *Stylaster*, *Allopora*, *Stenohelia* and *Stylantheca* are treated as separate genera, while no attempts are made to separate the species of *Errina* into the subgenera *Errina* s. str., *Inferiolabiata* and *Lepidopora*. An appendix presents two species of the Scleractinian genus *Madrepora* (= *Amphe- lia*), one homonymous with a Stylasterine (though never confused), the other one erroneously placed, for some time, in the Stylasterina. The list of Stylasterine literature is exhaustive until the end of 1956.

BPN 209 S, 1957: Stylasterina in the collection of the Paris Museum III. *Stylaster flabelliformis* (Lamarck).

Redescription of *S. flabelliformis* after various large, fan-shaped colonies

(Lamarck's type¹) included), most of them labelled Mauritius or La Réunion, some others without detailed origin. Exhaustive synonymy with critical notes and reproduction of various old descriptions and figures. Confirmed records only from La Réunion and Mauritius; type locality restricted to the latter.

BPN 213 S, 1958: Proposed use of the plenary powers to validate the specific name "*gemmascens*" Esper, 1794, as published in the combination "*Madrepora gemmascens*" (Class Hydrozoa, order Stylasterina).

Under the name *Madrepora gemmascens*, Wilkens and Esper described, independently, a Scleractinian of the genus *Madrepora* (= *Amphelia*) and a Stylasterine of the genus *Stylaster*. The name *gemmascens* for the Scleractinian species has soon gone out of use, while it has regularly been used for the Stylasterine species. Consequently it is proposed to conserve the specific name *gemmascens* for the Stylasterine coral and to suppress it for the Scleractinian.

BPN 214 M, S, 1958: The species problem in corals.

Remarks on the problem of species distinction in genera where the shape of the coral is largely influenced by environmental conditions. In the genus *Millepora* several distinct species are now admitted and no longer a single, highly variable one. Remarks on colonies of different shape found growing side by side exposed to the same external conditions, and on differences in the structure of ampullae. Though frequently considered as conspecific, *Distichopora violacea*, *D. nitida* and *D. coccinea* show constant characters which allow for the separation as distinct species.

BPN 221 S, 1959: Revision of the Indo-Pacific species of the genus *Distichopora*.

Remarks on previous attempts to revise the 32 species of *Distichopora* from the Indo-Pacific region (31 species originally ascribed to the genus and one here transferred from *Sporadopora*). Comparative notes on sulcus and rows of pores, width and shape of gastropores, gastrostyles, ampullae, granulation of the surface, form of growth, etc. Key to nine well-defined Indo-Pacific species recognized by the author: *D. violacea*, *D. gracilis*, *D. coccinea*, *D. nitida*, *D. irregularis*, *D. profunda*, *D. providentiae*, *D. borealis*, and *D. serpens*. Detailed, illustrated descriptions, with exhaustive synonymy and discussion, of each of these species, together with descriptions and

¹) Boschma does not make it clear whether this specimen should be considered the holotype, the lectotype or a syntype.

critical remarks on *D. fulvacea* and *D. livida*, little-known, doubtful species, closely allied to *D. violacea*. The paper does not include any allusion to the West Indian species of *Distichopora*.

BPN 230 S, 1960: Opmerkingen over een zuidafrikaanse Stylasteride.

Considerations on the affinities of an unnamed new Stylasterine from Cape Agulhas, South Africa (later described as *Gyropora africana*, BPN 234), characterized by gastropores arranged in deep grooves, with representatives of the three recognized subfamilies of Stylasteridae: Stylasterinae (genus *Stylantheca*), Distichoporinae (genus *Distichopora*) and Errininae (*Errinopora pourtalesii* and *E. stylifera*). It is concluded that the new coral should be placed in the Errininae.

BPN 231 S, 1960: Notes on the Stylasterine coral *Allopora profunda* Moseley.

Redescription after the type¹⁾ material from the South West Atlantic (off the Rio de la Plata) and previously unknown additional specimens from a second station of the Challenger Expedition (southern Chile). Comparisons, from literature, with various other species, especially with *Allopora moseleyana*. The paper includes an extensive citation of Moseley's description of *A. profunda* and an exhaustive analysis of all later remarks on the species.

BPN 232 S, 1960: The Stylasterine coral *Allopora stellulata* (Stewart).

Redescription of Stewart's species from the South Pacific (here transferred from *Stylaster* to *Allopora*), based on the holotype and additional specimens from Tahiti, and on specimens from the Tuamotu Atolls. Stewart's description and figures are reproduced and all later remarks on the species are analyzed. Comparison with *Stylaster sanguineus*, another pink coloured species from the Pacific.

BPN 234 S, 1960: *Gyropora africana*, a new Stylasterine coral.

Description of a new genus and new species, with gastropores in a row on the bottom of deep grooves and dactylopores on the sides of the grooves. The coral appears to show some affinities to each of the three subfamilies of the Stylasteridae, though perhaps most closely resembling some forms of the Errininae. Detailed comparison with *Stylantheca porphyra*, *Distichopora irregularis*, *Errinopora pourtalesii* and *E. stylifera*. Extensive considerations on the phylogeny in Stylasteridae and on the evolution of specialized characters, including remarks on diverse genera.

¹⁾ Apparently syntypes; no lectotype designation.

BPN 235 S, 1960: The Stylasterine coral *Allopora bithalamus* (Broch).

Description based on many colonies from eight stations off South Africa, some of these close to the type locality. The majority of the colonies deformed by Polychaete gall-tubes. Study of the variation in shape of the gastrostyle, which appears to have a greater range than in other species of the genus. Remarks on the constriction separating the gastropore into an upper and a lower chamber, a character common to *A. bithalamus* and various other species of the genera *Allopora*, *Stylaster*, *Conopora* and *Crypthelia*.

BPN 238 M, 1961: Notes on *Millepora braziliensis* Verrill.

In addition to *Millepora alcicornis*, *M. squarrosa* and *M. complanata*, *M. braziliensis* (previously considered by the author as synonymous with *M. alcicornis*) is recognized as a fourth, distinct species of *Millepora* in the western Atlantic. These considerations are based on material from Trinidad Island, off Brazil. In addition the status of various other species of *Millepora*, including forms from the Indo-Pacific, is discussed.

BPN 240 S, 1961: Stylasterina (In: Résultats scientifiques 'Calypso': Gulf of Guinea).

The first part of the paper is a review of the literature from the sixteenth century to the present time, dealing with the West African "blue coral", which was used as an ornament and of which several authors supposed that its substance was derived from corals. The second part consists of notes on *Allopora subviolacea* Kent (type locality unknown) and the corals abusively assigned to it, including the species which in the present paper is recognized as distinctly different, *Allopora blattea* new species. The third part contains the description of *Allopora blattea* from shallow water at São Tomé (type locality) and Annobon Islands in the Gulf of Guinea, abundantly collected by the 'Calypso' Expedition in 1956. Comparison with the holotype of *Allopora subviolacea* (type locality unknown but apparently from South Africa). Remarks, from literature, on *Allopora rosacea* Greeff, a little-known species from the Gulf of Guinea, and on various other species of the genus *Allopora*.

BPN 246 S, 1962: Notes on the Stylasterine coral *Allopora miniata*.

Description of *A. miniata* based on syntypes at the Museum of Comparative Zoology, Cambridge, Mass., from deep water off Florida. Reproduction in extenso of Pourtalès' original description, inventory of previous opinions on the affinities of the species. From a detailed comparison with *Allopora norvegica* from Norway it is concluded that *A. miniata* and

A. norvegica are different species, though similar in various aspects. The paper includes detailed figures of *A. norvegica*.

BPN 248 S, 1962: Notes on *Stylaster lonchitis* Broch.

Previously known only from the type locality (Pemba Channel), *S. lonchitis* is redescribed after specimens from a second locality in Tanzania (Southern Zanzibar Channel). The identification of the new material is confirmed by comparison with (fragments of) the syntypes, branches of which are figured in detail. Two other species with a spiny surface are mentioned (*Stylaster granulatus*, *S. asper*).

BPN 250 M, 1962: On Milleporine corals from Brazil.

Specimens from various parts of Brazil are referred to *M. braziliensis*, *M. squarrosa* and *M. nitida*. Other western Atlantic species mentioned are *M. alcicornis* and *M. complanata* from the West Indies. Previously considered by the author as synonymous with *M. alcicornis*, *M. nitida* from Brazil is here revalidated and found very similar to the Red Sea species *M. exaesa*.

BPN 255 A, 1963: The generic name *Axopora*.

Review of the paleontological literature on Hydrocorals referable to the genus *Axopora*; synonymy of the genus including notably *Holoraea* and *Lobopora*, and synonymy of the main species. Histories of the supposed affinities with Sponge and Scleractinian genera previous to the discovery of its affinities to Milleporina.

BPN 256 A, 1963: Notes on species of the genus *Axopora*.

Eighteen specimens referable to the fossil hydrocoralline genus *Axopora* are studied and the main characteristics of the eleven described species are discussed. As a result only 4 or 5 species are recognized in the genus *Axopora*. *Axoporella* Boschma (BPN 174) is now merged into *Axopora*, as the gastrostyles have been found similar in both genera. A separate order of Hydrocorals is proposed, Axoporina, of equal standing to the orders Milleporina and Stylasterina.

BPN 257 S, 1963: On the Stylasterine genus *Errina*, with the description of a new species.

Extensive review of previous attempts (mainly by Hickson and Broch) to arrange the species of the genus *Errina* (= *Labiopora*, = *Spinipora*, = *Lepidopora*, = *Labiata*, preoccupied, = *Inferiolabiata*) in separate genera,

subgenera or groups of species. New definitions of the three subgenera *Errina* s. str., *Inferiolabiata*, and *Lepidopora* in accordance with the characters of the type species (*E. aspera*, *I. labiata*, *L. glabra*). Lists of the species attributed to each of these subgenera: twelve to *Errina*, six to *Inferiolabiata* (including two fossil species), eight to *Lepidopora*. Not all species are sufficiently well known. Description of a new species, *Errina* (*Lepidopora*) *hicksoni* from deep water off the Azores ('Talisman' Expedition, 1883), which had been erroneously referred by Hickson (1912) to the West Indian *Pliobothrus tubulatus*. cursory comparison of the new species with the other species of the subgenus *Lepidopora*.

BPN 258 S, 1963: *Errina* (*Lepidopora*) *diffusa*, a new Stylasterine coral from South Africa.

Description based on specimens from two stations off East London, 84-88 m depth. The specific characters of the new species are compared with those of the eight other species (in part from literature), previously referred by the author to the subgenus *Lepidopora* (BPN 257).

BPN 259 S, 1963: The Stylasterine coral *Errina dabneyi*.

Redescription of *Errina* (*Errina*) *dabneyi* (Pourtalès) after the syntypes from the Azores (deep-water) at the Museum of Comparative Zoölogy, Cambridge, Mass., with historical notes on the material and remarks on other species of *Errina* described by Poursalès. Though originally included by Poursalès in *Lepidopora*, the species is a typical representative of the subgenus *Errina*. *Errina amoena*, described by the author in a previous paper (BPN 200), known from a single colony said to have come from the China Sea, is synonymized with *E. dabneyi*. *E. dabneyi* sensu Hickson, 1912, from the Azores, appears to differ from Poursalès' species, and is more similar to *E. aspera* (L.).

BPN 261 S, 1964: *Errina* (*Lepidopora*) *decipiens*, new Stylasterine coral from the West Indies.

Description based on material obtained by the 'Blake' in 1879 from deep water off Guadeloupe Island. The specific differences between the new species and the nine previously described species of the subgenus *Lepidopora* (BPN 258) are briefly noted. Since the West Indian species herein described was provisionally indicated by Poursalès with the (unpublished manuscript) name *Sporadopora decipiens*, remarks are added on all forms, recent and fossil, previously attributed to the genus *Sporadopora*.

BPN 262 S, 1964: On Stylasterina of the genus *Stenohelia*.

Historical notes on the genus *Stenohelia*, which should be kept separate from the closely allied genera *Allopora* and *Stylaster*. Reproduction of the figures of the type species, *Stenohelia maderensis*, from the earliest descriptions (Johnson, 1862; Kent, 1871). Remarks on other species subsequently referred to *Stenohelia*, especially *S. profunda* (original description reiterated) and *S. complanata*, both from the West Indies. Transfer to the genus *Stenohelia* of the species previously known as *Stylaster obliquus*, *Stylaster minimus*, *Stylaster tiliatus*, and *Stylaster umbonatus*. Description of two new species from deep water off the Galapagos Islands, *Stenohelia robusta* (detailed description) and *Stenohelia concinna* (preliminary description). The colonies of both species are distorted by Polychaete gall-tubes. For comparison figures and additional data are given of *Stenohelia challengerii* from the Kermadec Islands and of *Stenohelia maderensis* from St. Vincent, West Indies.

BPN 263 S, 1964: Further notes on the Stylasterine coral *Stenohelia concinna*.

The syntypes of *S. concinna*, from the Galapagos Islands, on which the preliminary description of the species was based (BPN 263), are described in detail, with additional photographs of some of these colonies, showing profound modifications in shape owing to associated Polychaetes. The species is compared with *Stenohelia robusta*, *S. challengerii*, *S. maderensis*, and *S. complanata*. *S. concinna* is characterized mainly by the strongly perforated walls of the ampullae, a peculiarity not occurring in any of the previously described species of the genus.

BPN 264 S, 1964: Further notes on the Stylasterine corals *Stenohelia challengerii* and *Stenohelia maderensis*.

In a previous paper (BPN 153) the name *Stenohelia challengerii* was introduced for *Stenohelia profunda* Moseley, because of homonymy with *Allopora profunda* Moseley, to accommodate for the frequent use of *Stenohelia* and *Allopora* as subgenera of *Stylaster*. In a second paper (BPN 204) the type locality of *S. challengerii* was restricted to 'Challenger' Sta. 23, off St. Thomas, West Indies. In the present paper Moseley's material from the two widely separated localities (West Indies and Kermadec Islands in the Pacific) is compared and referred to the same species. Material from the Kermadec Islands is figured for the first time. Specific differences with some other species of *Stenohelia* are pointed out. The second part of the paper contains the detailed description of material from St. Vincent, West Indies,

here, as in a previous paper (BPN 263), referred to *S. maderensis*. Transfer of the West Indian species *Crypthelia virginis* Lindström to the genus *Stenohelia*, where it appears to be more closely allied to *S. maderensis* than to *S. complanata*.

BPN 265 S, 1964: The Stylasterine coral *Allopora divergens*.

A. divergens is redescribed after syntypes from the Galapagos Islands and additional specimens from two other stations close to the type locality (all from the same cruise of the 'Albatross'). All previous references to the species in the literature are commented upon. Among the described species of the genus *Allopora*, two groups are distinguished: species with flabellate or subflabellate growth, and irregularly branching species. Among the latter *A. divergens* is compared with *A. carinata*, *A. granulosa* and *A. incompleta*.

BPN 266 A, 1964: *Axopora* Milne Edwards & Haime, 1850 (Hydrozoa, Milleporina): proposed validation under the plenary powers (Z.N.S. 1610).

The object of the note is to ask the International Commission on Zoological Nomenclature to validate the generic name *Axopora* (and thereby the family name Axoporidae) for fossil Hydrocorals by suppressing the generic name *Holaraea*.

BPN 267 S, 1964: On variation in *Stylaster sanguineus*.

Stylaster elegans Verrill is considered synonymous with *Stylaster sanguineus* Valenciennes in Milne Edwards & Haime, and the more important previous descriptions are analyzed and discussed. Syntype material of both *S. sanguineus* from Australia and *S. elegans* from the Marshall Islands is studied, together with additional material from other parts of the Pacific. The distribution of the species is reconsidered (no confirmed records from the Hawaiian Islands).

BPN 268 M, 1964: Notes on the ampullae of two species of *Millepora*.

Detailed study of the ampullae of *M. tenera* (Philippine Islands) and *M. dichotoma* (Eilat, northern Red Sea). Comparison with ampullae previously observed on forms from various other localities. It is now concluded that hardly any specific characters can be derived from the peculiarities of these receptacles. The only character for specific distinction in the genus *Millepora* remains the form of growth of the colonies which, however, is strongly influenced by environmental conditions.

BPN 270 S, 1964: Notes on the Stylasterine coral *Errina macrogastera*.

E. macrogastera is redescribed after three specimens from the type locality (Galapagos Islands, 704 m), each with deformations by Polychaete gall-

tubes. Remarks on the arrangement of the known species of *Errina* in three subgenera on account of the peculiarities of the dactylopores: *Errina*, *Inferiolabiata*, *Lepidopora*. *E. macrogastra* is referred to the subgenus *Errina* s. str. Synonymy of some of the other species of the subgenus *Errina*, especially that of *E. antarctica*. A final remark draws attention to the resemblance of the subgenus *Lepidopora* with the genus *Sporadopora*.

BPN 271 S, 1964: Notes on the Stylasterine coral *Errina labiata*.

Comments on the three subgenera of the genus *Errina* (*Errina*, *Inferiolabiata*, *Lepidopora*). Moseley's species *Spinipora echinata* and *Errina labiata* are representatives of *Inferiolabiata*. The latter is redescribed after syntype material from the South West Atlantic (off the Rio de la Plata), including a colony distorted by Polychaete gall-tubes. In addition to the type locality, Moseley mentioned *E. labiata* from the Tristan da Cunha group. The material in question is re-examined, but the specific identification of part of it has become impossible owing to decay, while another colony belongs to *Errina gracilis*, a species previously known only from the Antarctic. Furthermore a coral from Providence Island, between Madagascar and the Seychelles, previously identified with Moseley's *E. echinata* by Hickson & England (1909), is re-examined and referred to *E. labiata*.

BPN 272 S, 1965: On Stylasterine corals of the genus *Errina* from the island Mauritius.

Errina aspera is the only Stylasterine coral known to occur in the Mediterranean; corals from other localities have been identified with this species, but these identifications proved to be incorrect or doubtful. Previous to its description as a separate species, *Errina dabneyi* Pourtalès, from the Azores, had been referred to *E. aspera*. *E. aspera* sensu Hickson, 1912, from the Cape Verde Islands, appears to differ from characteristic Mediterranean specimens by a more hirsute appearance, whereas the pink coloured *E. aspera* reported by Broch (1942) from the West Indies (without further details) might represent a branch of *E. antarctica* of confused origin. In the present paper two colonies in the collection of the Muséum National d'Histoire naturelle, Paris, from unrecorded depth off the island Mauritius in the Indian Ocean, are considered representatives of a new subspecies, *Errina aspera mascarina*. They are compared with *E. aspera aspera* from the Mediterranean, a colony of which is figured.

BPN 273 S, 1965: On the supposed specific differences between *Errina antarctica* (Gray) and *Errina moseleyi* (Ridley).

The original descriptions of *E. antarctic* and *E. moseleyi*, as well as subsequent descriptions and views on both forms are analyzed and discussed. The holotypes from the South Atlantic (Burdwood Bank) and the South Pacific (southern Chile), respectively, are re-examined and compared with additional specimens from the French 'Romanche' Expedition to Cape Horn 1882-83, previously studied by Hickson (1912). It is concluded that *E. moseleyi* should be considered synonymous with *E. antarctica*.

BPN 274 S, 1965: *Errina carnea*, a new Stylasterine coral from the Antarctic.

The subdivision of the genus *Errina* into the subgenera *Errina*, *Inferiolabiata* and *Lepidora*, based on the peculiarities of the dactylopores, is summarized. The discovery of the new species *Errina (Errina) carnea* somewhat upsets the scheme previously adopted: the dactylopores have the shape characteristic of the subgenus *Errina*, while their openings are turned upwards towards the top of the branches, a character previously considered an exclusive attribute of *Inferiolabiata*. Accordingly the definition of the subgenera is slightly revised. *E. carnea* is described after material taken at three deep water stations in the Ross Sea ('Endeavour', New Zealand Oceanographic Institute). The species is found to differ distinctly from the two other species of the subgenus *Errina* known from Antarctic water, *E. antarctica* and *E. gracilis*.

BPN 275 S, 1965: Further notes on *Stylaster roseus* (Pallas) I, II.

In the first part the extensive synonymy of *S. roseus* (a shallow water species of the western Atlantic) is followed by reiteration and analysis of various old descriptions, comparative information on *Allopora blattea* (a shallow water species from the Gulf of Guinea) with regards to the isolated dactylopores, remarks on *Stylaster erubescens* (a deep water species from the West and North Atlantic occasionally and erroneously identified as *S. roseus*), and characterization of various colonies among the abundant material examined. The second part is mainly a detailed study of the cyclo-systems, isolated dactylopores and ampullae in *S. roseus* and provides comparative information on *Stylaster erubescens*, the deep water species occasionally confused with *S. roseus*. A colony of *Millepora complanata* from the Dominican Republic is figured as the substrate of *S. roseus*.

BPN 281 S, 1966: Notes on the Stylasterine coral *Allopora subviolacea* Kent.

Redescription of *A. subviolacea* based on the holotype and a second colony, both of unknown localities (and both with British Museum (Natural

History)), and on a third colony recently collected at Cape Agulhas, South Africa. There are no confirmed records from other areas than South Africa; Stylasterines reported from the Gulf of Guinea under that name belong to *Allopora blattea*. Furthermore *A. subviolacea* is compared with *A. nobilis* (= *A. explanata*), another species from South Africa.

BPN 282 M, 1966: On a new species of *Millepora* from Mauritius, with notes on the characters of *Millepora exaesa*.

The new species *M. tuberosa* is compared with various other species of *Millepora*, usually from the Indo-Pacific, and especially with *M. exaesa*, the synonymy of which is revised.

BPN 283 S, 1966: Stylasterina (In: B.A.N.Z. Antarctic Research Expedition).

Six species of Stylasterina were obtained at four stations (220-603 m depth) of the BANZARE in the sector between Enderby Land and Knox Land: *Allopora eguchii* new species, *Conopora pauciseptata*, *Errina antarctica*, *E. gracilis*, *E. labiata*, and *E. laterorifa*. Of these only *A. eguchii* and *C. pauciseptata* (both with branches strongly modified in shape by Polychaete gall-tubes) are studied in detail in the present paper; the announced paper on Antarctic species of *Errina* from the BANZARE and other Antarctic Expeditions unfortunately has never been published. The description of *C. pauciseptata* contains information on various other species of the genus *Conopora*. A brief survey of the South African Stylasterina shows that all records of their occurrence in other parts of the world, and especially in Antarctica, are incorrect or at least strongly questionable. Remarks are added with regard to the Antarctic Stylasterina studied by Eguchi (1964). Eguchi's *Errina* cf. *antarctica* is *E. gracilis*; his *E. laterorifa* is conspecific with *E. carnea* Boschma, 1965 (BPN 274) and has priority; his *Allopora bithalamus* is Boschma's new *A. eguchii* and is not identical with the South African species. The paper includes remarks on the distribution of all Stylasterine species recorded from Antarctica; some appear to be circum-antarctic, while others extend widely into the subantarctic areas, or exceptionally into temperate areas.

BPN 286 S, 1967: Comments upon Hickson's notes on Stylasterina in the collection of the Paris Museum.

Most of the six species from the 'Talisman' Expedition (1883) to the north-eastern Atlantic and *Errina antarctica* from the 'Romanche' Expedition to Cape Horn, 1882-83, previously reported upon by Hickson (1912), could

be re-examined. The identification of *Errina antarctica* proves correct. *Stylaster tiliatus* sensu Hickson, from the Cape Verde Islands, is identified with *Stenohelia maderensis*; the differences of the latter with the true *Stenohelia tiliata* are pointed out and information on various other species of *Stenohelia* is included. Hickson's identification of corals from the Cape Verde Islands with *Errina aspera* may be correct, but no specimens are available. *Errina dabneyi* sensu Hickson, from the Azores, shows a certain resemblance with *E. aspera*, but the specific identity with the latter remains extremely doubtful. Additional details observed in *Errina atlantica*, from the Azores, permit to refer this species to the subgenus *Errina* sensu stricto, not to *Lepidopora*. Hickson's *Pliobothrus tubulatus*, from the Azores, had already been redescribed (BPN 257) as *Errina (Lepidopora) hicksoni*; in the present paper additional specimens are studied. The only colony of *Pliobothrus symmetricus*, from the Azores, is a very characteristic one.

BPN 288 S, 1968: *Calyptopora reticulata*, n. g., n. sp., a Stylasterine coral from deep water in the New Zealand region.

Considerations on the rather arbitrary generic distinction of the Stylasterine corals (especially in the subfamily Stylasterinae), with extensive remarks on the genera *Crypthelia* and *Conopora*. *Calyptopora reticulata*, from the Antipodes Islands (1335 m) and from the Bounty Islands (1280 m) is the representative of a new genus, which in its general appearance closely corresponds with *Crypthelia* (cyclo systems partly covered by lids), but which differs from *Crypthelia* by having well developed gastrostyles. Polychaetes live in regular association with the coral in induced gall-tubes along the branches. The examination of the Stylasterina of the Siboga Expedition (Indonesia) proved that one of the six species referred by Hickson & England to the genus *Crypthelia*, *C. pachypoma*, has to be transferred to the genus *Calyptopora*, on account of the presence of gastrostyles.

BPN 289 S, 1968: *Errina cruenta*, a new Stylasterine coral from New Zealand.

Description based on specimens obtained at a locality about half-way between Stewart Island and Auckland Islands (81 m). By its robust growth *E. cruenta* shows some similarity to *E. antarctica*, but the coenosteum is much harder and the colour is more pronouncedly red.

BPN 290 M, S, 1968: The Milleporina and Stylasterina of the Israel South Red Sea Expedition.

The three species of *Millepora* previously known from the Red Sea are

represented among the material: specimens from Eilat (northern Red Sea) are identified with *M. platyphylla* and *M. dichotoma*, specimens from the Dahlak Archipelago (southern Red Sea) with *M. tenera*, doubtfully with *M. tenera*, and simply as *Millepora* sp. *Distichopora violacea* is the only Stylasterine coral obtained in the Dahlak Archipelago.

BPN 292 S, 1968: *Errina sarmentosa*, a new Stylasterine coral from deep water in the New Zealand region.

Description based on a single small colony obtained off the Antipodes Islands (1335 m). There is a Polychaete gall-tube along the stem of the flabellate colony. The new species is a representative of the subgenus *Lepidopora* and it is compared with all previously described species of this subgenus.

BPN 293 S, 1968: Notes on the Stylasterine coral *Calyptopora pachypoma* (Hickson & England).

As indicated in a previous paper (BPN 288) one of the species from the Siboga Expedition (Indonesia) originally referred to the genus *Crypthelia* by Hickson & England, *C. pachypoma*, has to be transferred to the genus *Calyptopora*. In the present paper a more elaborate description of the species is given from syntype material, and the specific differences with *Calyptopora reticulata*, type of the genus, are pointed out.

BPN 294 S, 1968: *Stenohelia conferta*, a new Stylasterine coral from the New Zealand region.

Description based on material from off the Antipodes Islands (1335 m). The new species is compared with all previously described species of the genus *Stenohelia*. In its form of growth it closely corresponds with *S. maderense*, *S. complanata* and *S. tiliata*, but the arrangement of the cyclo-systems is much more crowded than in these three species; the distance between the cyclo-systems is smaller than their diameter.

BPN 296 S, 1969: Stylasterina. Distribution of selected groups of marine invertebrates in waters south of 35° latitude.

The text includes a brief presentation of the hydrozoan order Stylasterina and comments on the distribution of the Stylasterine species recognized in the Antarctic, subantarctic and surrounding regions south of 35° latitude. The distributional data are compiled from the literature and completed by a few more localities from preliminary and otherwise unpublished investigations on collections from the Drake passage region. The distribution of

17 species is plotted on four maps: *Allopora eguchii*, *Allopora profunda*, *Allopora* n. sp., *Conopora pauciseptata*, *Errina antarctica*, *E. aspera*, *E. echinata*, *E. fissurata*, *E. gracilis*, *E. labiata*, *E. laterorifa*, *Errina* n. sp., *Errinopora* n. sp., *Errinopsis reticulum*, *Errinopsis* n. sp., *Stylaster densicaulis*, n. gen., n. sp. (unnamed). In addition, three species of the genus *Sporadopora* (but only two of them named: *S. dichotoma* and *S. mortenseni*) are mentioned in the text as occurring in the Antarctic-subantarctic region.

BPN 299 S, 1970: *Stylaster brunneus*, a new Stylasterine coral from New Caledonia.

Description of a new species collected by diving on reefs, and distinguished by its pronouncedly brown colour. In its forms of growth (fan-shaped colonies) it shows some resemblance to *Stylaster sanguineus*, a Pacific species of red colour from which it differs by various structural details of the skeleton, especially by the larger size of its cyclo systems.

3. BOSCHMA'S NEW SPECIES OF HYDROCORALS

Especially in his earlier papers on Hydrocorals Boschma did not always clearly designate the (holo)types of the new species and failed to indicate the depository institution. The information on type material is compiled below and completed wherever necessary and possible.

3. 1. New species of *Milleporina* ¹⁾

Millepora latifolia Boschma, 1948. New species (BPN 110: 21).

Type material. — Boschma designates as 'type specimen' (to be considered the holotype) the specimen the outline of which is given in text-figure 1 and which is characterized as "a plate-like growth with a height of 18 cm, a breadth of 14½ cm and a thickness (in its basal region) of about 1 cm". Parts of the same are figured on pl. 3 figs. 1 and 2 (topmost part of a plate-like part under different angles). It should be noted that another species, *Millepora intricata*, is attached to it.

Type locality. — Island Noordwachter, Java Sea (coll. H. Boschma, Sept. 1921).

Depository. — Rijksmuseum van Natuurlijke Historie, Leiden; RMNH Coel. 13748.

Millepora tenera Boschma, 1949. Nomen novum for *M. tenella* Ortmann, 1892, preoccupied (BPN 125: 669).

¹⁾ Additional new species of *Millepora* have recently been published by Nemenzo (1975: 22, pl. 1 figs. 1-2) as *M. cruzi* sp. nov. and by Zou (1978: 87, 89, pl. 1 figs. 5-6) as *M. xishaensis* sp. nov.

Type material. — Ortmann's cursory and unillustrated description of *Millepora tenella* does not provide any information on the number of specimens studied and their individual characters, such as size and shape. Boschma did not see Ortmann's material.

Type locality. — Upanga reef near Dar-es-Salaam, Tanzania, at ebb-tide (spring-tide) in the surf, in crevices of the reef zone (coll. A. Ortmann, 1890).

Depository. — Musée Zoologique, Strasbourg.

Millepora tornquisti Boschma, 1951. New species (BPN 152: 9).

According to Boschma *Millepora cylindrica* sensu Tornquist (1905: 332, pl. 46 fig. 8) is a species different from *M. cylindrica* Reuss, 1868. Boschma simply renamed it, reiterating the original description without adding further details.

Type material. — Tornquist's short description does not indicate the number of specimens studied. The only specimen figured by Tornquist (Pl. 46 fig. 8) is here designated as the lectotype. Boschma did not see Tornquist's material.

Type locality. — Island Makamby, Madagascar, Eocene deposits (coll. A. Voeltzkow, about 1890-1895).

Depository. — Unknown. Searched for in vain at the Musée Zoologique, Strasbourg (A. Voeltzkow was professor at Strassbourg).

Millepora tuberosa Boschma, 1966. New species (BPN 282: 410).

Type material. — Several colonies were used for the description of the new species; seven colonies of varying age (to be considered as syntypes) are figured individually on pl. 1 figs. 1-7.

Type locality. — Mauritius (Indian Ocean), Pointe Vacoas, depth of lagoon 1-2 m, incrusting stems of eel-grass or attached to dead coral agglomerates (coll. J. H. Stock, 5 February 1964).

Depository. — Zoological Museum, University of Amsterdam (ZMA Coel. 3852) (vide Van Soest, 1976, p. 90) ¹).

3. 2. New species of Axoporina

Axoporella kolosvaryi Boschma, 1954. New genus and new species (BPN 174: 101). Genus *Axoporella* subsequently synonymized with *Axopora* (BPN 256: 127).

Type material. — Description based on 'some fragments' of *Axopora ramea*

¹) This species has been synonymized by Zou (1978: 86, 89) with *Millepora exaesa* Forskål, 1775.

sensu Kolosvary (1949: 78), not *A. ramea* d'Achiardi. Only fragments of styli are figured by Boschma, no colony or fragments of colony.

Type locality. — Lower Eocene of Gant, Hungary.

Depository. — Magyar Memzeti Museum, Budapest 1).

3. 3. New species of Stylasterina

Stenohelia challengerii Boschma, 1951. Nomen novum for *Stenohelia profunda* Moseley, 1879 (BPN 153: 456).

Type material. — In a later paper Boschma (BPN 264: 78) refers to six specimens from the type locality, two of which are figured by Moseley (1881: pl. 12 figs 1 and 2).

Type locality (after restriction by Boschma, BPN 204: 31). — 'Challenger' Sta. 23, off St. Thomas, West Indies, 450 fathoms (823 m).

Depository. — British Museum (Natural History), 1880.11.25.182.

Errina (Errina) amoena Boschma, 1956. New species (BPN 200: 281). Type material. — Description based on a large colony (pls. 1, 2) and several fragments from that colony. The large colony constitutes the holotype, the fragments the schizoholotype.

Type locality. — China Sea, exact locality unknown; depth not recorded.

Depository. — Holotype at the Muséum National d'Histoire naturelle, Paris; schizoholotype in Rijksmuseum van Natuurlijke Historie, Leiden (RMNH Coel. 13907). The specimens came to the Paris museum through Mr. Montigny around 1851 with the reference 'Mer de Chine'.

Gyropora africana Boschma, 1960. New genus and new species (BPN 234: 424).

Type material. — Description based on two specimens, both figured (pl. 1 figs. 1, 3, 6-9, larger specimen; pl. 1 figs. 2, 4, 5, smaller specimen). The larger specimen is herewith designated the lectotype, the smaller one the paralectotype.

Type locality. — University of Cape Town Ecological Survey, TRA 151 N — 6 March 1958, 34°51'S 19°35'E, 22 m, vicinity of Cape Agulhas, South Africa.

1) The deposition of the type material is not quite clear. From Boschma's notes it appears that he intended to return the material to the Budapest museum, but we have no proof that he actually did. The quantity of specimens studied by Boschma does not appear unambiguously from his paper and there is no loan-sheet. If Boschma did return the 'type specimens' to the Budapest museum they were probably destroyed in 1956, but most likely the few fragments and slides now in the collections of the Rijksmuseum van Natuurlijke Historie is all of this species Boschma ever received. The depository of this material still has to be settled.

Depository. — Lectotype (in two parts) in Rijksmuseum van Natuurlijke Historie, Leiden (RMNH Coel. 13749); paralectotype not localized.

Allopora blattea Boschma, 1961. New species (BPN 240: 210).

Type material. — Description based on many colonies. One of these designated by Boschma as holotype (pl. 3 figs. 1-2), all other colonies from the same and other localities, as paratypes (pls. 4-6, and other unfigured specimens).

Type locality. — Holotype and several paratypes from 'Calypso' Sta. 70 — 19 June 1956, Praia Santa Catarina on the west coast of São Tomé, 3-10 m. Additional paratypes from various other stations (same expedition) at São Tomé and Príncipe Islands (Gulf of Guinea).

Depository. — Holotype and paratypes in Muséum National d'Histoire naturelle, Paris; paratypes in Rijksmuseum van Natuurlijke Historie, Leiden, viz., Calypso, Gulf of Guinea, 1956, Sta. T 25, 15 June 1956, Punta Furada, São Tomé, 3-8 m, dry colony (RMNH Coel. 13750A) and alcohol preserved specimens (RMNH Coel. 13750B). Two paratypes, RMNH Coel. 13902, have been collected at São Tomé in 1956 by M. Marche-Marchad. In addition there are fragments from Calypso Sta. T 25 and 70, that have been used by Boschma to make preparations and have not been given paratype status.

Errina (Lepidopora) hicksoni Boschma, 1963. New species (BPN 257: 339).

Type material. — Boschma designated as holotype (not studied by him) the specimen figured by Hickson (1912; pl. 8, upper figure) with the explanation "*Pliobothrus tubulatus* Azores 56 meters". As paratype he designated another specimen figured in his own publication (pl. 1 figs. 1-3).

Type locality. — Indication by Boschma partly incorrect, herewith corrected. 'Talisman' dredge 123 — 13 August 1883, 38°23'N 28°49'45"W, 560 m, Azores.

Depository. — Holotype not at Muséum National d'Histoire naturelle as indicated by Boschma, but at the British Museum (Natural History) (1964.9.17.11). Paratype at the Manchester Museum. Additional topotypic specimens at the Muséum National d'Histoire naturelle, Paris, and the British Museum (Natural History) (1977.8.2.1).

Errina (Lepidopora) diffusa Boschma, 1963. New species (BPN 258: 391).

Type material. — Description based on 15 specimens from two stations, but only five and three colonies, respectively, are specially mentioned by Boschma and have all been figured (pl. 1 figs. 1-8). These include six pink colonies

from SCD 296 M, five of which are figured (pl. 1 figs. 1-5); and nine colonies (some pink, some white) from SCD 254E, F, three of which are figured (pl. 1 figs. 6-8). The stations have erroneously been changed in the explanation of the plate. The pink colony figured on pl. 1 fig. 2, from SCD 296 M, is herewith designated the lectotype, all other colonies from both stations form the paralectotypes.

Type locality. — Designated by Boschma as 'South Africa, off East London, depth 84-88 m', which includes two stations of the University of Cape Town Ecological Survey: SCD 254 E, F — 16 July 1961, 33°07.3'S 28°01'E, 88 m and SCD 296 M — 6 February 1962, 33°09'S 28°02'E, 84 m.

Depository. — Lectotype (RMNH Coel. 13751) and paralectotypes (Sta. SCD 254 E, F: RMNH Coel. 13801; Sta. SCD 296 M: RMNH Coel. 13802) are in Rijksmuseum van Natuurlijke Historie, Leiden.

Errina (Lepidopora) decipiens Boschma, 1964. New species (BPN 261: 56).

Type material. — The description is based on one specimen figured by Boschma (pl. 1 figs. 1-3) and designated the holotype. Boschma reports that originally this specimen has been selected out of several others, all from the same station, but he did not give type status to the remaining colonies.

Type locality. — Designated by Boschma. 'Blake' Sta. 164-21 January 1879, 15°55'55"N 61°41'35"W, 151 fathoms (276 m), off Guadeloupe Island, West Indies.

Depository. — Holotype and additional specimens from type locality, in Museum of Comparative Zoölogy, Cambridge, Mass.

Stenohelia robusta Boschma, 1964. New species (BPN 262: 70).

Type material. — Description based on two specimens from one station, both figured by Boschma and designated by him as holotype (pl. 1 figs. 7-8, pl. 2 figs. 1-3) and paratype (pl. 1 figs. 9-10, pl. 2 figs. 2, 4), respectively.

Type locality. — 'Albatross' Sta. 3404 — 28 March 1891, 01°03'00"S 89°28'00"W, 385 fathoms (704 m), off Galapagos Islands.

Depository. — Holotype and paratype in National Museum of Natural History, Washington, D.C., cat. no. 21282.

Stenohelia concinna Boschma, 1964. New species (BPN 262: 69).

Type material. — To the preliminary description (BPN 262) are added the figures (natural size) of 6 specimens designated by Boschma as holotype (pl. 1 fig. 5) and paratypes (pl. 1 figs. 1-4, 6), respectively. The detailed description published later (BPN 263) is based on the same six specimens

(holotype, pl. 1 fig. 2, pl. 2 fig. 1; paratypes pl. 1 figs. 1, 3, 4, pl. 2 figs. 2-3, all enlarged).

Type locality. — 'Albatross' Sta. 4642 — 7 November 1904, 01°30.5'S 89°35'W, 300 fathoms (550 m), off Galapagos Islands.

Depository. — Holotype and paratypes in National Museum of Natural History, Washington, D.C.

Errina aspera mascarina Boschma, 1965. New subspecies (BPN 272: 3). Type material. — The description is based on two colonies designated by Boschma as holotype (pl. 1 figs. 3-4, pl. 2 figs. 1-2) and paratype (pl. 1 figs. 1-2, pl. 2 figs. 3-4), respectively.

Type locality. — Mauritius (Indian Ocean). No further details.

Depository. — Muséum National d'Histoire naturelle, Paris.

Errina (Errina) carnea Boschma, 1965. New species (BPN 274: 21). Type material. — Description based on several specimens (number not indicated) from three stations of the Ross Sea Survey, carried out by the New Zealand Oceanographic Institute in the 'Endeavour' (A 455, A 463, A 464). Two of these are figured, a complete, small colony from A 464 (pl. 1 fig. 1) and a branch from A 463 (pl. 1 fig. 2). Because no types have specifically been designated by Boschma, the branch from A 463 (pl. 1 fig. 2) is herewith designated the lectotype, all other specimens and branches from the three stations form the paralectotypes¹).

Type locality. — Designated by Boschma as Ross Sea, Antarctica. This includes three stations of the New Zealand Oceanographic Institute Ross Sea Survey in January, 1959: A 455, 74°22'S 178°35'W, 322-340 m; A 463, 72°20'S 174°50'E, 468-465 m, and A 464, 73°20'S 174°00'E, 369-384 m.

Depository. — Lectotype (P-290) and paralectotypes (P-291, A 455; H-77, A 464) in the collections of the New Zealand Oceanographic Institute, Wellington; paralectotypes from each of the stations in Rijksmuseum van Natuurlijke Historie, Leiden (A 455: RMNH Coel. 13761; A 464: RMNH Coel. 13752).

Allopora eguchii Boschma, 1965. New species (BPN 283: 109). Type material. — Boschma refers to six fragments, 19 to 38 mm high, two of which are figured. The fragment figured on pl. 1 figs. 6 and 8, is herewith designated the lectotype; the fragment figured on pl. 1 fig. 7 as the

¹) Our designation differs from that in Dawson's (1979) Catalogue of types in the NZOI. As Boschma did not indicate a holotype for this species, Dawson's holotype designation is invalid; moreover, the specimen (Boschma, 1965, pl. 1 fig. 1) on which it is based could not be traced. Unfortunately, there is thus no conformity in the numbering of the specimens of this species in Dawson's and the present papers.

paralectotype. The other four fragments referred to by Boschma are also designated paralectotypes. The additional five smaller fragments, all from the same station but not mentioned by Boschma, do not have type status.

Type locality. — B.A.N.Z. Antarctic Research Expedition, Sta. 34—7 January 1930, 66°21'S 58°50'E, 603 m, Antarctic waters between Enderby Land and Knox Land.

Depository. — Rijksmuseum van Natuurlijke Historie, Leiden, lectotype RMNH Coel. 13753, paralectotypes RMNH Coel. 13901.

Calyptopora reticulata Boschma, 1968. New genus and new species (BPN 288: 102).

Type material. — Boschma refers to material from two stations of the New Zealand Oceanographic Institute, F 123 and F 132, designating material from F 132 as types: a big colony (pls. 1 and 2) as holotype and 'several' fragments (altogether 19) as paratypes. No type status is given to the fragments from F 123.

Type locality. — New Zealand Oceanographic Institute Sta. F 132 — 29 January 1965, 49°59'S 177°32'E, 1335 m, off the Antipodes Islands; the other station, F 123 — 27 January 1965, 47°38'S 178°57'E, 1280 m, off the Bounty Islands.

Depository. — Holotype (H-48) and principal paratypes (P-100) in the collections of the New Zealand Oceanographic Institute, Wellington. A dry (RMNH Coel. 13754A) and an alcohol preserved (RMNH Coel. 13754B) paratype in Rijksmuseum van Natuurlijke Historie, Leiden.

Errina (Errina) cruenta Boschma, 1968. New species (BPN 289: 109). Type material. — Boschma refers to material from one station, a large colony of which is designated by him as holotype (pl. 1 fig. 1) and 'several' smaller colonies or fragments as paratypes; in addition to the two figured paratypes (pl. 1 figs. 2 and 3) there are about 30 smaller colonies or fragments.

Type locality. — New Zealand Oceanographic Institute Sta. D 156 — 16 January 1964, 48°01.5'S, 166°35'E, 81 m, about halfway between Stewart Island and the Auckland Islands.

Depository. — Holotype (H-49) and paratypes (P-10) in the collections of the New Zealand Oceanographic Institute, Wellington¹⁾. A dried paratype (RMNH Coel. 13755A) and an alcohol preserved paratype (RMNH Coel. 13755B) in Rijksmuseum van Natuurlijke Historie, Leiden.

¹⁾ The number of the holotype of this species in Dawson's Catalogue of types in the NZOI (1979: 24) is incorrectly given as H-149 but should read H-49 (see page 46 where the number H-149 is correctly used for the holotype of the isopod *Dynamenoides decima* Hurley & Jansen, 1977).

Errina (Lepidopora) sarmentosa Boschma, 1968. New species (BPN 292: 203).

Type material. — The description is based on a single, figured colony which constitutes the holotype (pl. 1 figs. 1-4).

Type locality. — New Zealand Oceanographic Institute Sta. F 132 — 29 January 1965, 49°59'S 177°32'E, 1335 m, off the Antipodes Islands.

Depository. — Holotype (H-50) in the collections of the New Zealand Oceanographic Institute, Wellington. A tiny (schizoholotype) fragment (RMNH Coel. 13756) in Rijksmuseum van Natuurlijke Historie, Leiden.

Stenohelia conferta Boschma, 1968. New species (BPN 294: 435).

Type material. — Description based on seven specimens, all from one station and designated by Boschma the holotype (pl. 1 figs. 4, 6) and paratypes (pl. 1 figs. 1-3, 5, 7-9), respectively.

Type locality. — New Zealand Oceanographic Institute Sta. F 132 — 29 January 1965, 49°59'S 177°32'E, 1335 m, off the Antipodes Islands.

Depository. — Holotype (H-53) and five paratypes (P-102, P-103, P-105, P-106 and P-107) in the collections of the New Zealand Oceanographic Institute, Wellington. One paratype (RMNH Coel. 13757 = NZOI, P-104) in Rijksmuseum van Natuurlijke Historie, Leiden.

Stylaster brunneus Boschma, 1970. New species (BPN 299: 153).

Type material. — Description based on six colonies from two stations at New Caledonia; designated by Boschma as: holotype (pl. 1 fig. 3) and three paratypes (one figured, pl. 1 fig. 2) from Island Kuaré, near New Caledonia, and 2 paratypes (one figured, pl. 1 fig. 1) from Nouméa.

Type locality. — Not designated in detail by Boschma, but to be restricted to the Island Kuaré, south of New Caledonia (\pm 32 km south of ile Uen, 22°46.3'S 166°48.5'E), grotte de Merlet on the outer part of the reef, 35 m (collected by M. Wijsman-Best, 4 August 1968). Part of the paratypes originates from Nouméa, passe Dumbéa, 10-40 m (collected by M. Wijsman-Best, 22 June 1968).

Depository. — Zoological Museum, University of Amsterdam, holotype (ZMA Coel. 5564) and two paratypes (ZMA Coel. 5565, 5566). Rijksmuseum van Natuurlijke Historie Leiden, three paratypes (RMNH Coel. 6597, 6598, 6599).

4. ADDITIONS TO BOSCHMA'S LIST OF THE DESCRIBED SPECIES OF STYLASTERINA

The following genera, species and subspecies are not to be found in Boschma's 'List of the described species of the suborder Stylasterina'

published in 1957 (BPN 204). All but one (omitted by Boschma) are posterior to the publication of the list. They are presented here in alphabetical order, Boschma's species without any comments (detailed information in the preceding chapter), the species of the other authors with pagination and indication of the type locality.

Allopora abei Eguchi, 1968: 34.

Off the Aleutian islands (collected by T. Abe).

Allopora blattea Boschma, 1961.

Allopora boschmai Eguchi, 1965: 218 (Eguchi, 1968: 35).

Japan, off Izu Peninsula, Zenisu Bank, 33°54'N 138°49,2'E, 27 m (Sichito-maru Sta. 13).

Allopora eguchii Boschma 1965.

Allopora hattorii Eguchi, 1968: 27.

Japan, off Koiwatogohama, Hachijojima, 87 m (3 August 1934).

Allopora scabiosa infundibuliporus Eguchi, 1968: 33.

Japan, Sagami Bay, Amadaiba Kannonzुकadashi, 80 m (20 July 1952).

Astya nielsenii Wells, 1976: 6.

Eocene of Eua, Tonga Islands.

Calyptopora pachypoma (Hickson & England, 1905).

Previously known as *Crypthelia pachypoma*, transfer to *Calyptopora* by Boschma, 1968 (BPN 288, 293).

Calyptopora reticulata Boschma, 1968.

Crypthelia vetusta Wells, 1976: 5.

Eocene of Eua, Tonga Islands.

Distichopora (Haplomerismos) anceps Cairns, 1978: 84.

Off Laysan, Hawaiian Islands, 25°55.22'N 171°55.13'W, 658-736 m (27 July 1972).

Errina carnea Boschma, 1965.

Errina cruenta Boschma 1968.

Errina decipiens Boschma 1964.

Errina diffusa Boschma 1963.

Errina hachijoensis Eguchi, 1968: 48.

Japan, off Hachijojima, 200 m (collected by H. Niino).

Errina hicksoni Boschma, 1963.

Errina japonica Eguchi, 1968: 47.

Japan, east of Origasaki, Kojima, Hachijojima, 85 m (2 August 1934).

Errina laterorifa Eguchi, 1964: 5.

Antarctic, 68°12'S 35°52'E, 870 m and 68°07'S 32°00'E, 570 m.

Errina aspera mascarina Boschma, 1965.

- Errina porifera* Naumov, 1960: 514.
Northwest Pacific, south of Paramushir Island and Sea of Okhotsk side of Shiashkotan Island, 190-250 m.
- Errina sarmentosa* Boschma, 1968.
- Errinopora intervacans* Naumov, 1960: 520.
Sea of Japan near Moneron Island (Tatar strait), 84 m.
- Errinopora latifundata* Naumov, 1960: 517.
Sea of Okhotsk at entrance of Skelekhov Bay, 109 m.
- Gyropora africana* Boschma, 1960.
- Pliobothrus grantmackieii* Squires, 1965: 24.
Oligocene of New Zealand, Gee Greensand, Waitakian stage at the south side of Gee's Point, Kakanui, Northland.
- Sporadopora cleithridium* Squires, 1958: 25.
Upper Miocene of New Zealand, Kapitean of Port Craig, Rowallon S.D., Southland. [Squires (1962: 136) refers *S. cleithridium* to the genus *Axoporella* Boschma, 1954].
- Stenohelia boschmai* Wells, 1976: 3.
Eocene of Eua, Tonga islands.
- Stenohelia concinna* Boschma, 1964.
- Stenohelia conferta* Boschma, 1968.
- Stenohelia echinata* Eguchi, 1968: 36.
Japan, Aoyamadashi, Amadaika, Sagami Bay (20 July 1935).
- Stenohelia robusta* Boschma, 1964.
- Stylaster brunneus* Boschma, 1970.
- Stylaster chibaensis* Eguchi, 1954: 79 (Eguchi, 1968: 26).
Miocene of Japan, south of Iwaihara, Oikawa-mura, Isumi-gun, Chiba-ken, lower part of Otadai bed.

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6. INDEX TO THE STYLASTERINA MENTIONED IN BOSCHMA'S PAPERS

Boschma's work on Milleporina (13 recent species recognized by the author, with extensive synonymies and remarks on fossil forms) and on Axoporina (10 fossil species recognized by the author, with extensive synonymies) is concentrated in 15 and 6 publications, respectively: (Milleporina 105, 108, 110, 114, 115, 125, 130, 141, 152, 201, 214, 238, 250, 268, 282; Axoporina 152, 174, 201, 255, 256, 266). Boschma's papers on the Stylasterina comprise 54 titles and include information (by compilation and

by original work) on 195 nominate species and subspecies, some of these synonymized by the author.

The present index provides the references (Boschma Publication Numbers) of all these species and subspecies of Stylasterina. The publications containing photographic illustrations are given in bold-faced characters.

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