A REVIEW OF THE NEW GENUS *ANISCHNOGASTER* IN THE PAPUAN REGION (HYMENOPTERA, VESPIDAE)

by

J. VAN DER VECHT
Burg. Vermeerlaan 4, Putten, Netherlands

With 60 text-figures and one plate

The Stenogastrinae, a group of subsocial wasps currently regarded as a subfamily of the Vespidae (Richards, 1962: 4), have a remarkable distribution. Most of the species are inhabitants of the Oriental region, where their range extends from Southern India eastward to the Philippine Islands, Celebes, Sumba and Flores. No Stenogastrinae have ever been collected in the Moluccas, but the group is well represented in the Papuan area, occurring throughout New Guinea and in the neighbouring islands of Waigeo, Misool and Aru.

From 1831 to 1913 nine species have been described from this area, but from examination of the types we have learned that only six of these may be regarded as good species. Various collections made in New Guinea during the last forty years contain representatives of at least as many new species, and as the material of some of these is still very scanty, there is little doubt that further collecting will bring additional species to light.

The known Papuan species belong to two distinct groups which are sufficiently different from their Oriental relatives as well as from each other to be treated as genera. One genus is *Stenogaster* Guérin, 1831, based on the first species of the subfamily to become known, *S. fulgipennis* Guérin; it was described from material collected at "Dory" (= Manokwari) in N. W. New Guinea by the famous expedition of the "Coquille". I hope to discuss the very difficult taxonomy of this genus in a future paper. The members of the second group, which forms the subject of this study, are placed here in a new genus, *Anischnogaster*. In general appearance the species of this genus are rather similar to certain species of the Oriental genus *Parischnogaster* Schulthess, but since particularly the males differ in several respects and do not have any of the specialized characters of that genus (dilated tarsi of mid legs, broadly flattened parameral spine of genitalia), there appear to be good reasons to regard the Papuan group as generically different.

The material on which the present study is based, approximately 210 specimens, has mainly been obtained from the Rijksmuseum van Natuurlijke Historie at Leiden, the Bernice P. Bishop Museum at Honolulu, and the British Museum (Natural History), London. The names of these Institutions are abbreviated in the following pages: ML, BISH, and BM, respectively.

Anischnogaster gen. nov.

Head, including the clypeus, approximately as high as wide (distinctly higher than wide in *Stenogaster*). Mandibles of female as in other Stenogastrinae, in the male with one or two small teeth on inner side near apex (in male of *Stenogaster* at most bluntly angled on inner side). Second segment of maxillary palpi usually at least twice as long as the third (in *Parischnogaster* all segments approximately equal in length). Mesoscutum more or less coarsely rugose or punctato-rugose. Scutellum convex without median carina. Mid tarsi of male symmetrical (in *Parischnogaster* one or more segments dilated and asymmetrical). Propodeum rugose with narrow median furrow (in *Eustenogaster* and *Liostenogaster* [1]) shiny, smooth or finely punctate, with fine median suture). Apex of propodeum without raised margin around the apical orifice (with such a margin in *Stenogaster*). Second gastral segment with more or less distinct neck (figs. 4-6, 18, etc.) (without neck in *Eustenogaster* and *Liostenogaster*).

Male genitalia: parameral spine long, with row of hairs on proximal half to two-thirds; volsella with proximal end more or less distinctly club-shaped, distally with fringe of long hairs near base of digitus, the apex of which is shaped like a bird's head; aedeagus slender, with short, flattened, apodemes and a pair of ventral processes near the base of the apodemes.

Length to apex of second gastral segment: 11-14 mm.

Type species: *Ischnogaster iridipennis* Smith, 1859.

The males of this genus generally do not have such striking secondary sexual characters as those of some other genera (*Parischnogaster*, *Stenogaster*), but there is one very interesting exception. The male of *Anischnogaster loriai* (Buysson) has a peculiar cavity at the base of the hind metatarsus, half covered by a curved lamella (figs. 51-53). It would be very interesting to determine the function of this unique structure, which is possibly of significance during courtship.

The nests of several Oriental Stenogastrinae have been described and figured [1]), but up to the present nothing seems to have been published about the nesting habits of the Papuan species. The notes on some *Anischnogaster*

1) For the diagnoses of these genera see Van der Vecht, in: Yoshikawa c.s., 1969.

nests presented in this paper may therefore be of special interest. The nests are made of mud or of vegetable material (probably) comminuted dead wood or bark) and consist of some isolated or somewhat irregularly clustered cells; they appear to be more primitive than the nests built by most of the Oriental relatives.

Key to the species

1. Second gastral sternite with large Y-shaped yellow mark (figs. 5, 6) or with two diverging stripes (fig. 18). Eye-emarginations yellow, rarely (in mountain areas) partly or entirely dark. Clypeus entirely yellow or with dark anterior margin. Second segment of maxillary palpi more than twice as long as the third (fig. 10). Neck of second gastral segment rather long (figs. 4-6, 18). Marginal hairs of terminal sternite of ♂ much shorter than in fig. 32 2
— Second gastral sternite with two parallel yellow stripes or with large spot which is not incised in the middle posteriorly. Eye-emarginations brown to blackish . . . 3
2. Supraclypeal area densely punctate in the middle, but lateral third with only a few punctures and rather shiny, the puncturation somewhat denser below the antennal sockets. Yellow mark on pronotum not sharply defined and usually not reaching the tegulae. The short procumbent pubescence on the face (examine under high magnification against lighted background!) consists of rather sparse, curved hairs. Yellow mark on sternite 2 rarely divided by dark line . . *iridipennis* (Smith)
— Supraclypeal area dull, with coarser microsculpture, laterally more densely punctate. Yellow mark on pronotum well defined, extending to the tegulae. Short pubescence on face much denser, the hairs longer and almost straight. Second gastral sternite with two diverging stripes . . . . . *spilaspis* (Cameron)
3. Second segment of maxillary palpi only about 1½ times as long as the third. Neck of second gastral segment short. Clypeus and supraclypeal area almost entirely yellow. Marginal hairs of terminal sternite of ♂ long (fig. 32). Lamina of volsella trapezoidal (fig. 34); aedeagus slender (figs. 35, 36) . . . *dubia* spec. nov.
— Second segment of maxillary palpi about twice as long as the third . . . 4
4. Second gastral sternite with a single, large, yellow spot of variable shape (figs. 38-40). Supraclypeal area yellow, except at lateral margins; interocular part of clypeus yellow, anterior portion and the narrow space between clypeus and eyes brownish (fig 37). Scutellum brown, without yellow spots (always?). Mandibles of ♂ bidentate (fig. 41); hind tarsi of ♂ normal . . . . . *laticeps* spec. nov.
— Second gastral sternite with two yellow stripes (fig. 54). Supraclypeal area brown with two yellow spots which are often connected with two irregularly shaped spots on the clypeus (fig. 47). Scutellum usually marked with yellow. Mandibles of ♂ tridentate (fig. 49); hind metatarsus of ♂ dilated at base, ventrally with oval cavity, the outer margin of which is produced into a curved, translucent, lamella which covers the proximal part of the cavity (figs. 51-53). Third submarginal cell narrowed anteriorly (fig. 50) . . . . . *loriai* (Buysson)

Anischnogaster iridipennis (Smith) (figs. 1-13, 57, 58)

Ischnogaster iridipennis Smith, 1859, Journ. Linn. Soc. (Zool.), 3: 166, ♂ — "Aru", leg. Wallace (lectotype by present designation in Oxford Univ. Mus.); 1864, Journ. Linn. Soc. (Zool), 7: 41 (Misool); 1865, Journ. Linn. Soc. (Zool.), 8: 89 (New Guinea) [?erroneously recorded from Sula Is.]; 1871, Journ. Linn. Soc. (Zool.), 11: 378 (cat.). —

1) For a recent review see Iwata, 1967.

Dalla Torre, 1894, Cat. Hym., 9: 113 (cat.); 1904, Gen. Ins., 19: 84 (cat.). — Meade-Waldo, 1912, Ann. Mag. nat. Hist., (8) 9: 447 (South New Guinea); 1914, Ann. Mag. nat. Hist., (8) 14: 405 (syn.: *Ischnogaster malayaensis* Cameron, 1906); 1915, Brit. Ornith. Union Exp. Dutch New Guinea, Rept. Hym. (sep.): 9 [as 1912].

Stenogaster iridipennis; Schulthess, 1927, Supplta ent. (Berlin), 16: 86, 87 (cat.; ?or *Parischnogaster*).

Ischnogaster malayaensis Cameron, 1906, Tijdschr. Ent., 49: 231, ♀ — "Etna Bay, New Guinea" (1 ♀, Mus. Amsterdam). — Meade-Waldo, 1914, Ann. Mag. nat. Hist., (8) 14: 405 (syn. of *Ischnogaster iridipennis* Smith).

Ischnogaster coriaceus Buysson, 1907, Notes Leyden Mus., 29: 79, ♂ — "Nouvelle Guinée (Bernstein)" (1 ♂, Mus. Leiden); 1911, Abh. senckenb. naturf. Ges., 34: 229 (Dobo, Aru, leg. Merton). — Schulthess, 1914, Zool. Jb. Syst., 37: 255 (in subgenus *Parischnogaster*). [New synonymy].

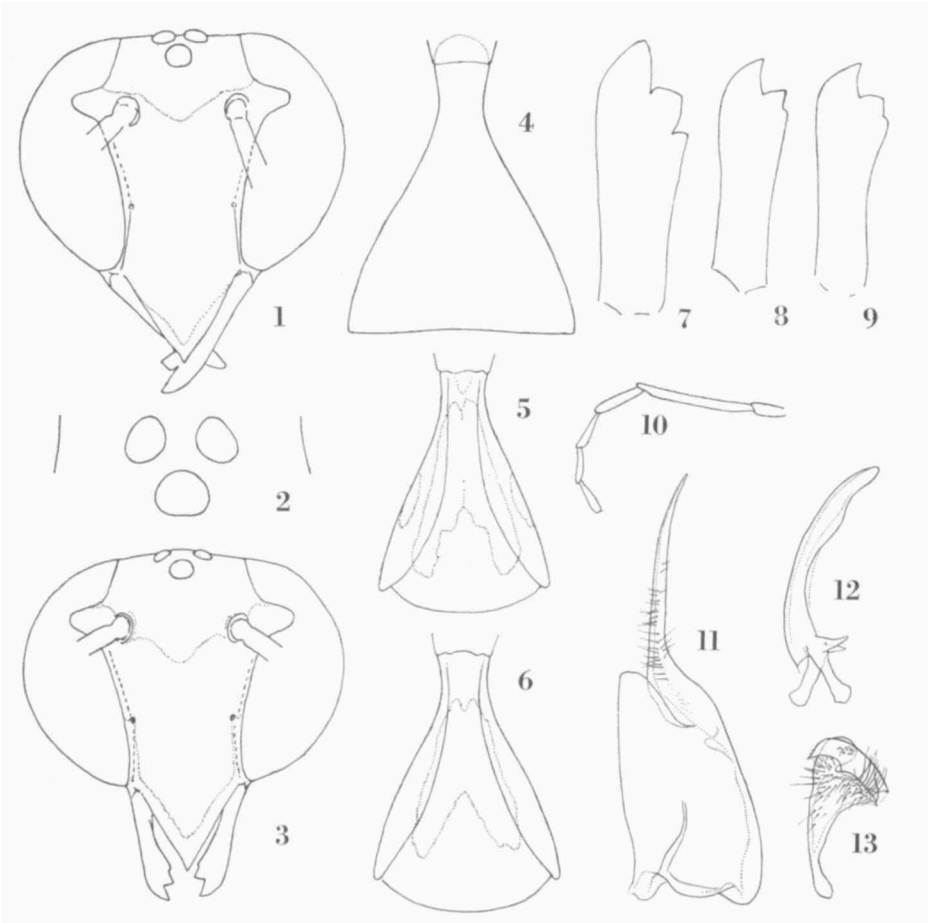
Parischnogaster (?) *coriaceus*; Schulthess, 1927, Supplta ent. (Berlin), 16: 87 (cat.).

Head: figs. 1 (♀) and 3 (♂). Mandibles of ♂ with two teeth on inner side, the proximal tooth blunt and very small (figs. 8, 9). Apex of clypeus in both sexes rather sharply pointed. Second segment of maxillary palpi more than twice as long as the third (fig. 10). Neck of second gastral segment rather long (figs. 4-6). Terminal gastral sternite of ♂ concave, its margin as seen from above narrowly protruding beyond the edge of the corresponding tergite, marginal hairs short and not very numerous. Male genitalia: figs. 11-13.

Head moderately shiny, finely coriaceous; clypeus distinctly punctate on median part of basal half, but the punctures small and shallow, the sides more sparsely punctate, in the ♀ the anterior half with scattered, coarser, setigerous punctures; supraclypeal area densely punctate in the middle, laterally almost impunctate, except below the antennal sockets, between and above these the puncturation coarser; eye-emarginations and genae practically impunctate. Face with very short procumbent pubescence, and with scattered longer hairs; the latter in the ♀ much longer on the anterior portion of the clypeus than elsewhere. Thorax almost entirely rugose or punctato-rugose; lateral angles of pronotum striate; hypo-epimeral area as a rule with distinctly separated punctures; sculpture of scutellum and metanotum much less coarse than on mesoscutum; also the metapleura more superficially sculptured than the adjoining parts. Propodeum rugose. Gaster rather shiny, very finely coriaceous.

Ground colour varying from paler to darker brown, sometimes partly blackish; antennae dark brown, scape, pedicel, and underside of five or more distal segments ferruginous; mouth parts, apex of gastral petiole and base of second gastral segment often more or less ferruginous.

Pattern of yellow markings somewhat variable, often more or less reduced in mountain areas, usually as follows: mandible (ferruginous yellow), lower part of genae, clypeus (often brownish at anterior margin), supraclypeal



Figs. 1-13. *Anischnogaster iridipennis* (Smith). 1, head ♀, type of *Ischnogaster malayaensis* Cameron; 2, ocelli ♀, do.; 3, head ♂, Aru; 4, second gastral segment ♀, type of *I. malayaensis*; 5, second gastral sternite ♂, Manokwari; 6, do., Kokoda; 7, mandible ♀, type of *I. malayaensis*; 8, do., ♂, Aru; 9, do., ♂, Manokwari; 10, maxillary palpus ♂, Manokwari; 11-13, paramere, dorso-lateral aspect of aedeagus, and volsella ♂, Araucaria Camp.

area, eye-emarginations (sometimes partly dark), a narrow band on raised anterior margin of pronotum, ill-defined band on pronotal dorsum (usually interrupted in the middle, posteriorly not extending to tegulae), two large marks on mesepisternum, separated by the transverse suture, two spots on scutellum (sometimes absent), two on metanotum (= postscutellum) (in some specimens almost confluent), a spot in upper part of metapleura (sometimes absent), a band on lower third to half of propodeum (often gradually merging into the ferruginous-brown colour of the upper part), more or less

extensive spots on coxae, a line on outer side of tibiae I and II, two irregular marks on the dilated part of the first gastral sternite (petiole), a spot on each side of tergite 2 (may be reduced or absent), a Y-shaped spot on sternite 2 (figs. 5, 6), a large spot on each side of tergite 3 and smaller ones on sternite 3, some spots on segment 4 (as a rule not or only partly visible), and an elongate spot on each side of sternite 6. — It should be noted that in old or poorly preserved specimens the pattern may have become indistinct.

Length (h. + th. + t. 1 + 2): 12-14 mm.

Waigeo. — 1 ♀ Camp Nok, 2500 ft, May 1938, Miss L. E. Cheesman (BM).

Misool. — 1 ♀ "Mysol, 61-224" [blue round label = leg. Wallace!] (BM) (eye-emarginations partly dark); 1 ♀ "M" (= Misool, leg. Wallace) (Saunders coll. in Oxford Univ. Mus.); 4 ♀ Fakal, 1 ♂ Waima, Sept.-Oct. 1948, M. A. Lieftinck (ML) (eye-emarginations entirely dark in the ♀♀, almost entirely yellow in the ♂).

Aru Is. — 1 ♂ "Aru", leg. Wallace (lectotype, Saunders coll. in Oxford Univ. Mus.); 1 ♂ "Aru", do. (BM, no. 58-129), 2 ♂ "Aroo", do., ex coll. Smith (BM, no. 99-303); 2 ♂ Aru, 1909, leg L. von Heyden (Mus. Paris); 5 ♂ Dobo, Wammer, 30 Jan. 1908, H. Merton (Mus. Senckenberg, Frankfurt, 2 ♂ ML).

N. W. New Guinea. — 1 ♂ "New Guinea" [? Vogelkop], leg. Bernstein (type of *Ischnogaster coriaceus* Buysson, ML); Vogelkop, 1 ♀ Sorong, Kampong Rufei, 24-31 Oct. 1948, M. A. Lieftinck (ML), 4 ♀ Klamono Oilfields, 18-24 Aug. 1948, M. A. Lieftinck (ML), 1 ♂ road Ajamaru—Teminabuan, 7 June 1952, L. D. Brongersma & W. J. Roosdorp (ML), 10 ♂ Manokwari, 18-24 July 1957, D. Elmo Hardy (BISH); 1 ♂ Roon, ex coll. Fruhstorfer (coll. Giordani Soika); 1 ♀ Etna Bay (4.00 S, 134.30 E), New Guinea Exp. 1904-5 (type of *Ischnogaster malayaensis* Cameron, Mus. Amsterdam; see figs. 1, 4 and 7); 2 ♀ 1 ♂ Hollandia, June 1937, W. Stüber, ex coll. Van der Vecht (ML), 1 ♀ do., July 1938, L. J. Toxopeus (ML), 1 ♀ do., harbour, 6 Aug. 1952, L. D. Brongersma (ML), 1 ♂ do., strip 2 H, Oct. 1956, G. den Hoed (ML); 1 ♀ Bewani Mts., Sept. 1937, 1 ♀ 13 ♂ Humboldt Bay, Pukusam Distr., W. of Tami River, June 1937, leg. W. Stüber (BM, no. 1938-177, 3 ♂ ML)., Archbold Expedition 1938-9: 1 ♀ 1 ♂ Bernhard Camp, 13 Sept. and 15 Aug. 1938, resp. (ML), 20 ♀ 10 ♂ Araucaria Camp, 800 m, 7 March-2 April 1938, one female with nest (fig. 57), L. J. Toxopeus (ML, Mus. Bogor and Mus. New York), 1 ♀ Moss Forest Camp, 2800 m, 19 Oct. 1938, L. J. Toxopeus (ML); 1 ♀ Upper Sermowai River, 400 m, 1 April 1911, K. Gjellerup (ML); 1 ♀ Central Mountains, Mulik River, 10 km East of Archbold Lake, 1050 m, 25 Nov.-5 Dec. 1961, S. & L. Quate (BISH).

S. W. New Guinea. — 1 ♀ Mimika River, Aug. 1910, A. F. R. Wollaston (BM, no. 1911-229).

N. E. New Guinea. — 1 ♀ Torricelli Mts., Mokai Hill, 750 m, 8-15 Dec. 1958, W. W. Brandt (BISH); 1 ♀ Bainyik, 150 m, S. of Maprik, 12 Jan. 1960, T. C. Maa (BISH); 1 ♀ Wewak, 2-20 m, 13 Oct. 1957, J. L. Gressitt (BISH); 1 ♀ Baiyer River, 1000 m, 1-4 Sept. 1969, Y. Hirashima (BISH); Finisterre Range, Saidor, 1 ♂ Sibog Vill., 6-16 June 1958, 1 ♂ Gabumi, July 1958, W. W. Brandt (BISH); 1 ♀ Mt. Missim, 1600 m, 5 May 1966, in light trap, O. R. Wilkes (BISH), 1 ♀ do., 980 m, 20 July 1969, J. L. Gressitt & Y. Hirashima (ML); 1 ♀ 6 miles N.W. of Lae, rain forest, 9 July 1957, D. Elmo Hardy (BISH); 2 ♀ 3 ♂ Nadzab, June-Aug. 1944, K. V. Krombein and U. N. Lanham (coll. Krombein, U. S. Nat. Mus., 1 ♂ ML); 3 ♂ Simbang, Huon Golf, leg. Biró, 1899 (Mus. Budapest); 1 ♀ Garaina, 830 m, 13-15 Jan. 1968, J. &

M. Sedlacek (BISH); Morobe District, 1 ♂ Ulap, 800-1000 m, 1 ♀ Mindik, 1200-1600 m, Sept. 1968, N. L. H. Krauss (BISH).

Papua. — 1 ♀ Kiunga on Fly River, 14-17 Aug. 1957, W. W. Brandt (BISH); 1 ♂ Astrolabe Mts., Febr. 1893, L. Loria (Mus. Genova); 3 ♀ 1 ♂ Tapini, 975 m, 16-25 Nov. 1957, W. W. Brandt (BISH, 1 ♀ ML), 2 ♂ do., 800-1000 m, Nov. 1968, N. L. H. Krauss (BISH, 1 ♂ ML); 3 ♀ 1 ♂ Goilala, Loloipa, 1-15 Jan. 1958, W. W. Brandt (BISH); 2 ♀ Mafulu, 4000 ft, Jan. 1934, Miss L. E. Cheesman (BM); 3 ♀ 3 ♂ Kokoda, 1200 ft, Sept. 1933, Miss L. E. Cheesman (BM); 1 ♀ Port Moresby, E. W. Leggart (BM); 1 ♂ Saputa near Buna, 1943-4, Robert B. Sperry (Chicago Nat. Hist. Mus.); 1 ♀ 1 ♂ Mt. Lamington, 1300-1500 ft, C. T. McNamara (S. Austr. Mus.); 1 ♂ Menapi, Cape Vogel Peninsula, 0-30 m, 26-30 March 1953, G. M. Tate (Mus. New York); 1 ♀ Normanby I., Wakaiuna, Sewa Bay, 1-10 Dec. 1956, W. W. Brandt (BISH).

Anischnogaster spilaspis (Cameron) (figs. 14-23)

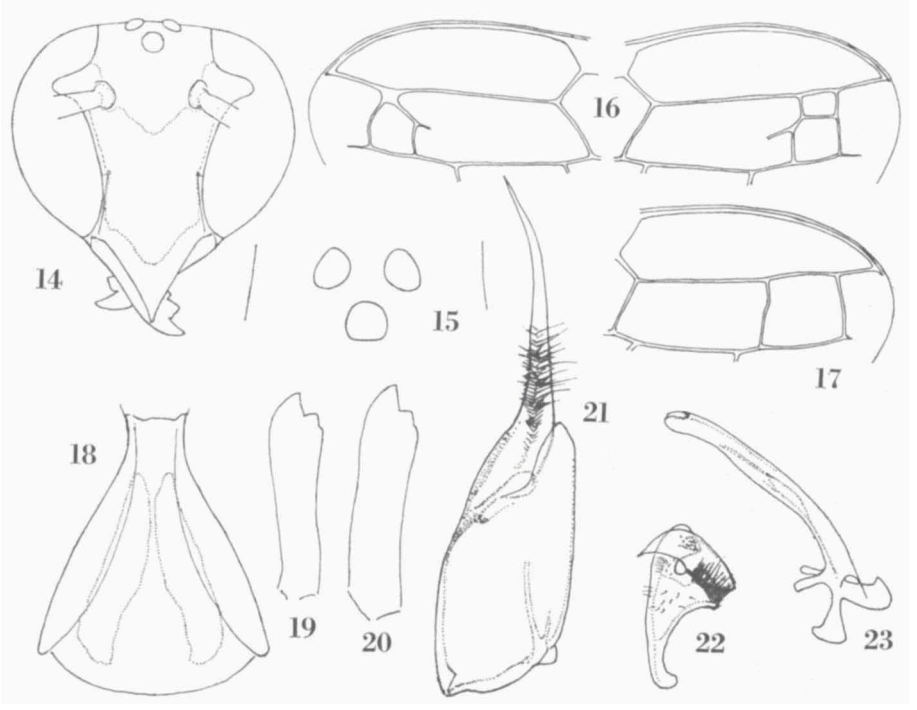
Ischnogaster spilaspis Cameron, 1913, Bijdr. Dierk., 19: 78, ♂ — "Waigeu, Dec. 30" (location of type ♂ unknown) [a ♀ from "Waigeoe, 31 Dec.", labelled "*Ischnogaster spilaspis* Cam. type" by Cameron is in Mus. Amsterdam]. — [Overlooked by Schulthess, 1927].

The original description of this species is rather unsatisfactory in certain respects, but since the basal half of the mandibles is said to be yellow, there can be no doubt that it was based on a male, and not on the female "type" (not mentioned in Cameron's paper) in the Zoological Museum of Amsterdam, for in this specimen the mandibles are uniformly brown. It appears uncertain whether the true type is still in existence; I have looked for it in vain in the two collections where it was likely to be preserved: the British Museum and the Museum of Amsterdam. Fortunately Cameron's notes on the differences between his *Ischnogaster malayaensis* and *I. spilaspis* indicate with sufficient certainty that his description was not based on a male of *A. iridipennis* (Smith), which species is also known to occur on the island of Waigeo.

Very similar to *A. iridipennis*, but readily distinguished by the almost entirely yellow pronotal dorsum.

Head of ♀: fig. 14, ocelli smaller than in the other species (fig. 15), in the ♂ the clypeus less pointed and the mandibles different (figs. 19, 20), with small and blunt inner tooth. Clypeus and supraclypeal area (♀) densely punctate and rather dull; pubescence of these parts much denser and somewhat longer than in *A. iridipennis*, in the ♂ even denser than in the ♀; outstanding hairs increasing in length towards the apex (♀), in the ♂ on the anterior portion hardly longer than elsewhere. Second segment of maxillary palpi more than twice as long as the third. Hypo-epimeral area slightly wider than in *A. iridipennis* and less regularly punctate. Sides of propodeum finely coriaceous, with indistinct punctures, not rugose.

Third submarginal cell variable, probably as a rule subquadrate and



Figs. 14-23. *Anischnogaster spilaspis* (Cameron). 14, head ♀, type; 15, ocelli ♀, type; 16, left and right wing tip with distorted third submarginal cell ♂, Ajamaru; 17, tip of normal wing ♂, Ajamaru; 18, second gastral sternite ♂, Ajamaru; 19, mandible ♂, Klamono; 20, do., Ajamaru; 21-23, paramere, volsella, and dorso-lateral aspect of aedeagus ♂, Ajamaru.

slightly narrowed anteriorly, but in the ♂ from Klamono distinctly higher than wide. In one male from Ajamaru this cell is peculiarly distorted in both wings (fig. 16); in the other the wings are normal (fig. 17).

Colour pattern mainly as in *A. iridipennis*; ground colour rather dark, thoracic markings more clearly defined and spots on pronotal dorsum larger, extending to the tegulae; second gastral tergite more or less distinctly yellowish near the stigma and with (1 ♂) or without (2 ♂) lateral spots; second sternite with two well separated yellow stripes (fig. 18).

Waigeo. — 1 ♀ 31 Dec. 1909, leg. Mrs. de Beaufort ("*Ischnogaster spilaspis* Cam. type", Mus. Amsterdam). The gaster of this specimen is lacking.

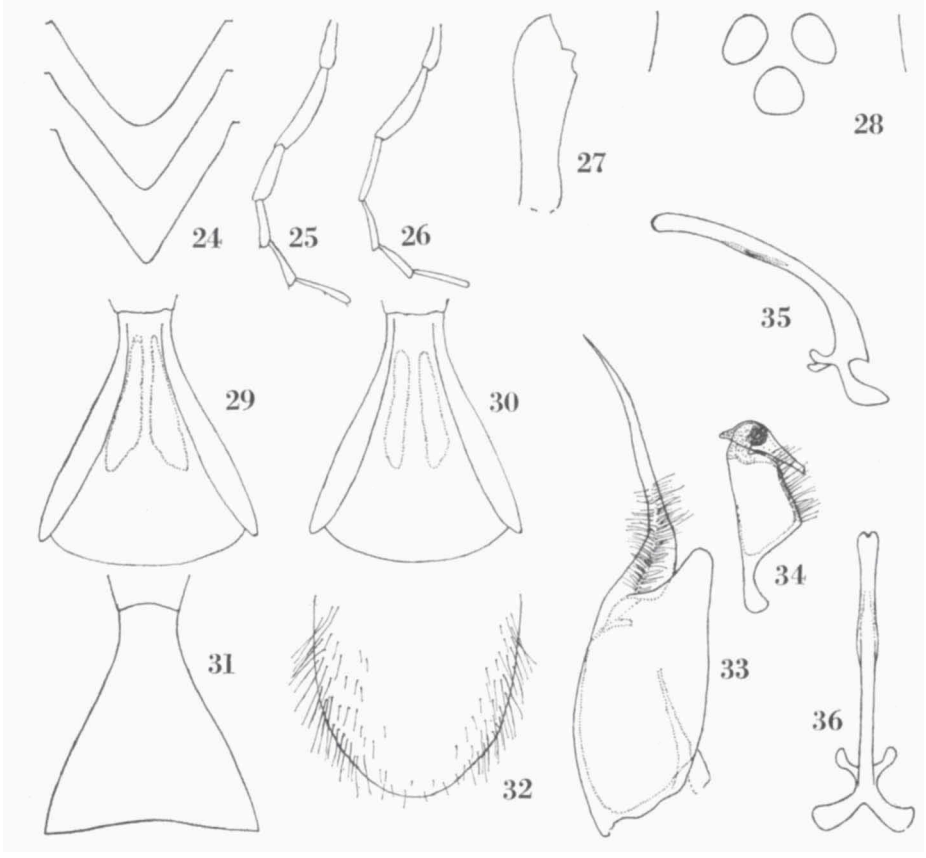
N. W. New Guinea. — Vogelkop, 1 ♂ Klamono, 18-24 Aug. 1948, M. A. Lieftinck (ML); 2 ♂ Ajamaru, 10 June 1952, L. D. Brongersma & W. J. Roosdorp (ML).

Anischnogaster dubia spec. nov. (figs. 24-36)

Second segment of maxillary palpi only about 1½ times as long as the third (figs. 25, 26). Clypeus and supraclypeal area finely and densely punc-

tate; the procumbent pubescence on these parts shorter and much denser than in *A. iridipennis*; outstanding hairs as in that species; frons punctato-rugose, eye-emarginations almost entirely rather densely punctate. Ocelli (fig. 28) as in *A. iridipennis*. Sculpture of mesoscutum not very coarse; scutellum and metanotum coriaceous, almost impunctate. Neck of second gastral segment relatively short (figs. 29, 30); pubescence of second sternite (to be examined in lateral view under high magnification) dense and extremely short, distinctly shorter than in *A. iridipennis*.

Male: clypeus not sharply pointed, its apical angle more or less distinctly



Figs. 24-36. *Anischnogaster dubia* spec. nov. 24, free part of clypeus ♂, Japen I., Torricelli Mts. and Hollandia, resp.; 25, maxillary palpus ♀, type; 26, do., ♂, Hollandia; 27, mandible ♂, Hollandia; 28, ocelli ♀, type; 29, second gastral sternite ♀, type; 30, do., ♂, Hollandia; 31, second gastral tergite ♂, Hollandia; 32, terminal sternite ♂, Mobitei; 33-36, paramere, volsella, and lateral and dorsal aspects of aedeagus ♂, Mobitei.

rounded (fig. 24); mandible with small and blunt inner tooth; terminal gastral sternite weakly concave, with long hairs at lateral margins (fig. 32).

Colour pattern in both sexes as in *A. iridipennis,* but the face less extensively yellow: anterior (triangular) part of clypeus (♀) or only the anterior margin (♂) pale brownish; eye-emarginations and a narrow stripe at inner eye-margins (including the furrows) brown to blackish. Yellow mark on pronotal dorsum large, but ill-defined and near the tegulae at most faintly indicated; metapleura entirely brown. Yellow band on propodeum abbreviated laterally. Fore and mid legs mainly brown (♀) or yellowish brown (♂), fore tibiae of ♀ with faint yellow line; hind legs mainly brown, with paler trochanters and tibial spurs. Second gastral tergite entirely brown with more or less yellowish neck, second sternite with two short stripes (figs. 29, 30), in some males these markings hardly visible.

Length (h. + th. + t. 1 + 2): ♀ 13 mm, ♂ 11-13 mm.

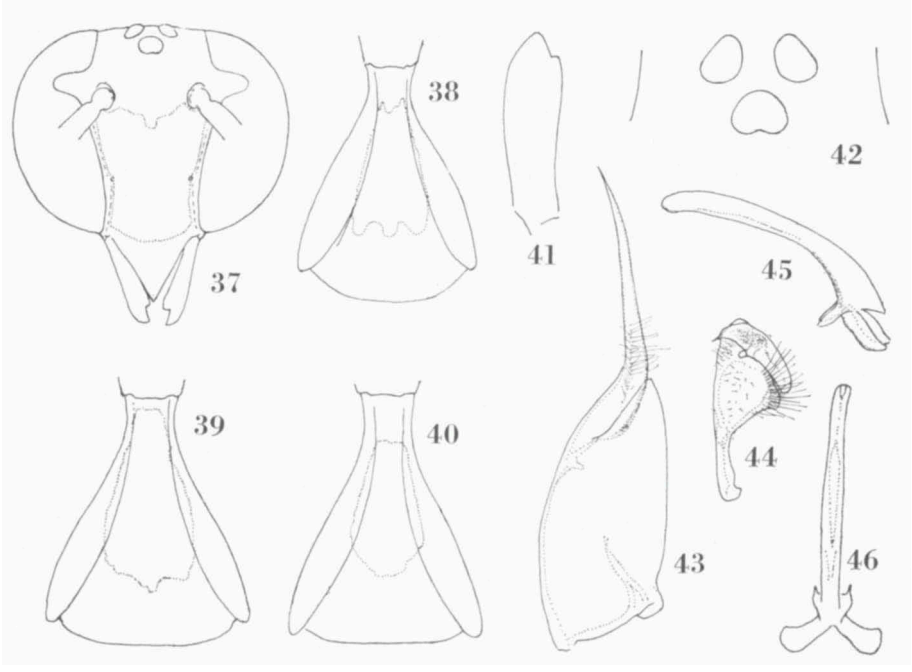
N.W. New Guinea. — 1 ♂ Japen I., SSE Sumberbaba, Dawai R., Oct. 1962, N. Wilson (paratype, BISH); 1 ♂ Hollandia, 3.10 S, 140 E, 300-600 m, Jan. 1938, W. Stüber (allotype, BM, 1938-481); 1 ♀ Araucaria Camp, 800 m, 27 March 1939, L. J. Toxopeus, Third Archbold Exp. (holotype, ML).

N.E. New Guinea. — 2 ♂ Torricelli Mts., Karandu Vill., 29-30 Nov. 1958, and Mobitei, 750 m, 16-31 March 1959, W. W. Brandt (BISH; ML).

Anischnogaster laticeps spec. nov. (figs. 37-46, 59)

Head broad, lower portion of eyes more bulging than in *A. iridipennis*, particularly in the ♂ (fig. 37). Second segment of maxillary palpi no more than twice as long as the third. Mandibles of ♂ with only one tooth on inner side (fig. 41). Clypeus of ♂ distinctly pointed, though much less sharply than in the ♀. Anterior ocellus broad, slightly emarginate anteriorly (fig. 42). Supraclypeal area and interocular portion of clypeus coriaceous, with dense and fine puncturation, rather dull (in the ♂ more sparsely punctured and slightly less dull); procumbent pubescence of these parts shorter and denser than in *A. iridipennis*; outstanding long hairs as in that species. Eye-emarginations with some very shallow and indistinct punctures. Mesoscutum rugose, with tendency to irregular longitudinal striation on posterior half. Propodeum distinctly rugose in the ♀, more superficially sculptured in the ♂, posteriorly and on part of the sides more or less distinctly striate. Terminal sternite of ♂ with short hairs; shape and pubescence of volsella characteristic (fig. 44).

Body generally darker than in *A. iridipennis*, and less extensively marked with yellow. Mandibles and genae brown to blackish; yellow area on face restricted to interocular part of clypeus and most of the supraclypeal area (lateral furrows and the space separating them from the eyes brownish);



Figs. 37-46. *Anischnogaster laticeps* spec. nov. 37, head ♂, Bernhard Camp; 38, second gastral sternite ♂, Bewani Mts.; 39, do., Bernhard Camp; 40, do. Araucaria Camp; 41, mandible ♂, Araucaria Camp; 42, ocelli ♀, type; 43-46, paramere, volsella, lateral and dorsal aspects of aedeagus ♂, Araucaria Camp.

vertex and eye-emarginations dark brown to black. Yellow markings of pronotum and mesepisternum present, but often somewhat less extensive than in *A. iridipennis*; mesoscutum black, scutellum, metanotum and metapleura brown (in one male from Bernhard Camp the latter with yellow spot); yellow mark on propodeum more or less reduced. Gaster dark brown, often with pale brownish ring at apex of petiole and neck of second segment; yellow markings mainly as in *A. iridipennis*, but tergite 2 without lateral spots and sternite 2 with a single large spot of variable shape (figs. 38-40), though apparently never incised in the middle posteriorly. Legs brown, partly pale brown, fore tibiae as a rule with yellow line on outer side.

Length (h. + th. + t. 1 + 2): 11-13 mm.

Holotype: ♀, North West New Guinea, Araucaria Camp, 800 m, 7 March 1939, L. J. Toxopeus, Third Archbold Exp.; allotype: ♂, same locality and collector, March 1939 (ML). — The specimens listed below are paratypes.

N. W. New Guinea. — Hollandia, 4 ♂, June 1937, W. Stüber, ex coll. Van der Vecht (ML); Humboldt Bay Area, 1 ♂ Pukusan Distr., W. of Tami River, June 1937, 2 ♂ Bewani Mts., Sept. 1937, W. Stüber (BM); S. of Mt. Bougainville, 1 ♀ 4 ♂ Njau-limon, 300 ft, 1 ♂ Mt. Nomo, 700 ft, Febr. 1936, Miss L. E. Cheesman (BM). Third Archbold Exp. 1938-9: 1 ♀ 5 ♂ Bernhard Camp, 50 m, 15-25 Aug. 1938,

4 ♂ Bernhard Camp B, 100 m, 6-10 April 1939, 2 ♀ do., with nest (fig. 59), 6 April 1939, 7 ♀ 4 ♂ Araucaria Camp, 7 March-2 April 1939, all. leg. L. J. Toxopeus (ML, Mus. Bogor and Mus. New York).

N. E. New Guinea. — 1 ♂ Torricelli Mts., Sugolitei Vill., 900 m, 24 Jan-5 Febr. 1959, W. W. Brandt (BISH).

Papua. — 1 ♀ Fly River, Olsobip, 400-600 m, Aug. 1969, M. Sedlacek (BISH)..

Anischnogaster loriai (Buysson) (figs. 47-56, pl. 1)

Ischnogaster loriai Buysson, 1909, Annali Mus. civ. Stor. nat. Genova, 44: 313, ♂ — "Nouvelle Guinée S. E. Moroka, 1300 m, L. Loria, VII-XI 1893" (Mus. Genova). — Schulthess, 1914, Zool. Jahrb. Syst., 37: 254 (in subgenus *Ischnogaster*).

Parischnogaster(?) *loriai* Schulthess, 1927, Supplta ent. (Berlin), 16: 87 (cat.).

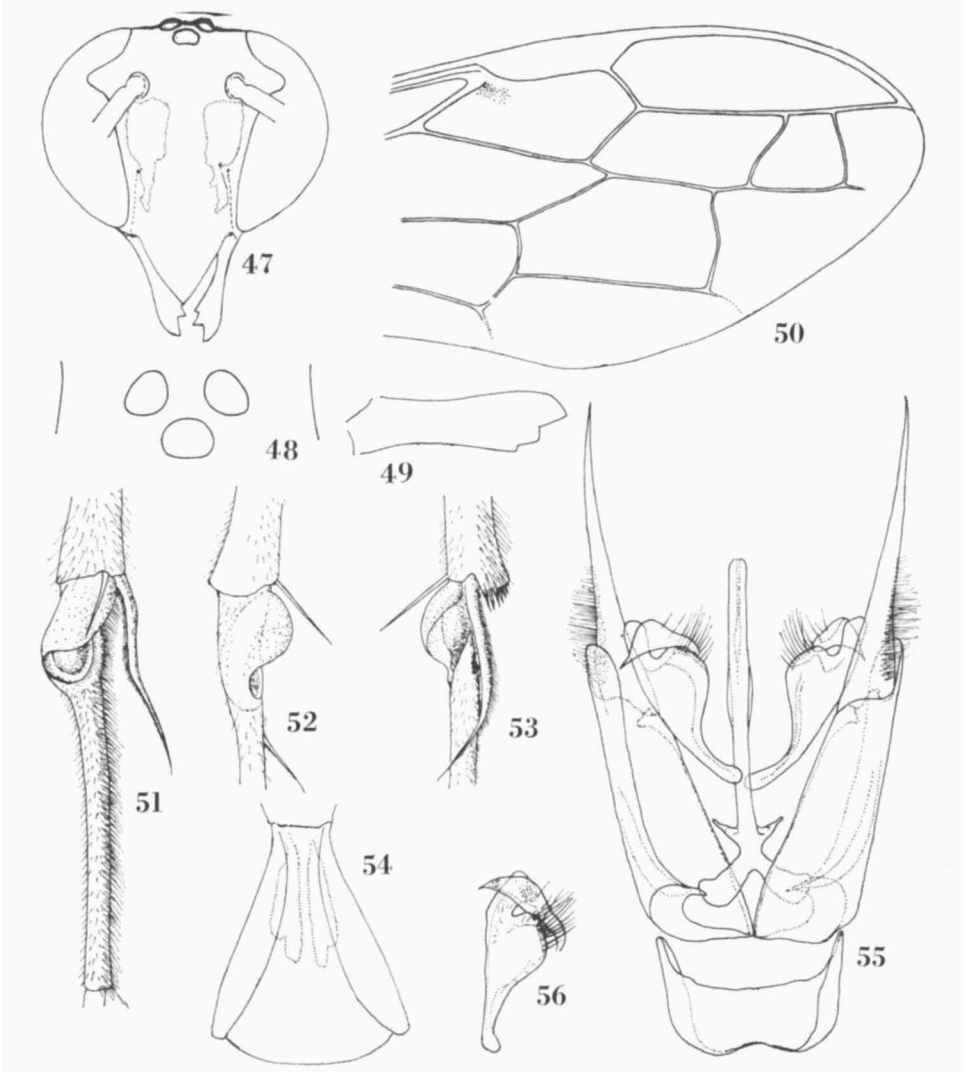
Second segment of maxillary palpi twice as long as the third. Mandibles of ♂ (figs. 47 and 49) with two teeth on inner side, the proximal tooth small, but often more acute than in the other species.

Clypeus moderately shiny, coriaceous and very finely and superficially punctate, some coarser setigerous punctures more numerous and with longer hairs on anterior part; supraclypeal area more distinctly punctate, particularly in the middle, the punctures sparser and smaller towards the eyes, but also here the puncturation distinctly denser than in *A. iridipennis*; frons rugosely punctate, eye-emarginations rather shiny, with indistinct and very shallow punctures; procumbent pubescence of face very short, outstanding hairs as in the other species. Supraclypeal area without distinct lateral furrows.

Mesepisternum above the transverse suture somewhat irregularly striate, margins of lower part mainly with similar sculpture, but the convex central portion finely coriaceous and sparsely punctate, the punctures very small and not sharply defined. Mesoscutum rugose; scutellum and metanotum with some shallow and indistinct punctures; hairs on posterior part of scutellum unusually long, about as long as those at apex of clypeus. Propodeum rugose posteriorly, lateral areas very superficially sculptured and partly rather shiny. In the series collected by the Archbold Expedition the transition between posterior and lateral areas of the propodeum is slightly less gradual than in the other specimens.

Third submarginal cell of fore wing distinctly narrowed anteriorly (fig. 50).

Hind basitarsus of ♂ with a very remarkable structure (figs. 51-53); the cavity often contains a pale yellow substance (more or less brownish in older specimens), which is hard in the dried insects, but becomes a soft paste when a little water is added. It seems probable that this is a glandular product, protected against moisture by the curved lamella. Special investigations will be necessary to determine the function of this peculiar organ. It might be helpful if collectors of nests would pay attention to the question whether the



Figs. 47-56. *Anischnogaster loriai* (Buysson). 47, head ♂, Rattan Camp; 48, ocelli ♂, Lower Mist Camp; 49, mandible ♂, Sigi Camp; 50, part of fore wing ♂, Sigi Camp; 51-53, different aspects of basitarsal organ of hind leg ♂, Rattan Camp; 54, second gastral sternite ♂, Sigi Camp; 55, genitalia ♂, left: ventral side, right: dorsal side, Rattan Camp; 56, volsella ♂, do.

yellow substance is already present in the organ of the males when they emerge from the cells.

Terminal sternite of ♂ flat or slightly concave, marginal hairs nearly as long as in *A. dubia*. Genitalia of ♂: figs. 55 and 56; pubescence of para-

meral spine denser than in the other species; volsellar lamina broader than in *A. iridipennis*, but shorter than in *A. dubia*.

Ground colour of body dark brown; mouth parts, anterior margin of pronotum, antennae and legs partly, base and apex of gastral petiole, and major part of terminal sternite pale brown; yellow markings variable, in most of the available specimens less extensive than in *A. iridipennis*, but where present usually well defined. Specimens from N. E. New Guinea have a richer pattern of yellow markings and are therefore treated as belonging to a different subspecies.

A. loriai loriai (Buysson)

Supraclypeal area with subrectangular spot, higher than wide, beneath each antenna as a rule connected with a spot of irregular shape on each side of the clypeus (fig. 47, the latter spots sometimes indistinct or absent). Pronotum with broad yellow band at posterior margin, narrowly interrupted in the middle, usually reaching the tegulae (abbreviated in some ♂♂ from Sigi and Rattan Camps and in ♀ from Star Range); mesepisternum with large spot on upper part (not extending to transverse suture, strongly reduced in ♀ from Star Range, absent in ♀ from Goilala), scutellum with two small spots (separated by distance greater than their diameter), sometimes indistinct or absent; propodeum with two small spots at apex above petiole, sometimes reduced or absent; gaster with no other yellow markings than a more or less distinct spot at apex of sternite 1, the neck of segment 2, and two short parallel stripes, sometimes almost confluent, at the base of sternite 2. Fore tibiae usually with yellow line on outer side, mid tibiae with small spot at base.

Length (h. + th. + t. 1 + 2): 12-14 mm.

N. W. New Guinea. — Archbold Expedition 1938-9: 3 ♀ 4 ♂ Rattan Camp, 1100-1200 m, Febr.-March 1939, 1 ♀ 3 ♂ Sigi Camp, 1350-1500 m, 17-24 Febr. 1939, 5 ♀ Lower Mist Camp, 1550-1600 m, five different dates from 14 Jan. to 1 Febr. 1939, all leg. J. Toxopeus (ML, Mus. Bogor, Mus. New York); 1 ♀ Star Range, Ok Tenma, 19 May 1959, L. D. Brongersma c. s. (ML).

Papua. — 1 ♂ Moroka (type, Mus. Genova, pl. 1); 1 ♀ Owen Stanley Range, Goilala: Tororo, 1560 m, 21-24 Febr. 1958, W. W. Brandt (BISH).

A. loriai maculata subspec. nov.

Mesepisternum with two large yellow spots, the lower one curved; spots on scutellum large, coalescent, forming a broad band on anterior two thirds, incised in the middle posteriorly; postscutellum with yellow band, pointed laterally, interrupted medially by dark line; yellow mark on propodeum more extensive, in some specimens covering more than the apical third, and

slightly extended on the sides, gastral tergite 3 on each side with yellow spot of variable size, sternite 3 with smaller spot (may be indistinct or absent).

Length (h. + th. + t. 1 + 2): 11-13 mm.

N. E. New Guinea. — 1 ♀ Sinofi, 1590 m, 30 km S. of Kainantu, 1-6 Oct. 1959, T. C. Maa (paratype, BISH). Morobe Distr., 1 ♀ Wau, 650 m, 12 Sept. 1961, J. Sedlacek (allotype, BISH); 1 ♂ do., 1700 m, 16 May 1965, J. & M. Sedlacek (paratype, BISH); 2 ♂ do., 1200-1680 m, 27 April 1968, R. C. A. Rice (paratypes, BISH, ML); 1 ♂ Mt. Kaindi, Nami Ck., 1700 m, J. Sedlacek (holotype, BISH).

Notes on nest architecture

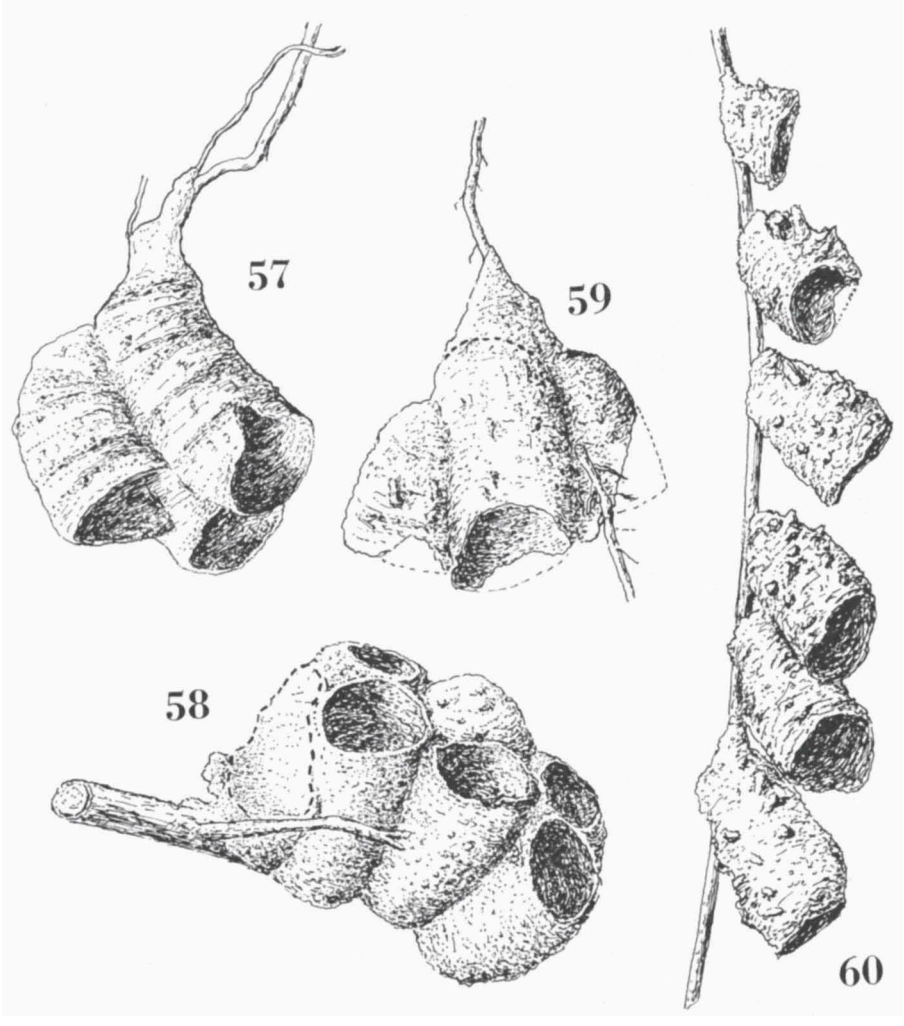
Anischnogaster iridipennis (Smith)

The nest shown in fig. 57 was discovered by the late Dr. L. J. Toxopeus under an overhanging bank above the river near the Araucaria Camp. The initial cell is attached to a thin tree root which is partly incorporated in the wall of the cell, the two other cells are fixed to the first one. The nest is built of mud mixed with some coarse soil particles; in some places the cells show a fairly distinct alternation of ochreous yellow and darker, more brownish, bands. The cells are rather smooth inside, the outer walls are somewhat rougher and bear some small and irregular protuberances. The nest was collected with a single female; none of the cells shows any traces of having contained a pupa.

The collection of Miss L. E. Cheesman (BM) contains an unlabelled nest which could be identified as belonging to this species from a pupa present in the closed cell (fig. 58). Three cells on the left of this closed cell (including the severely damaged cell indicated by a broken line) agree with it in having a very thin, shiny, lining on the inner wall, evidently consisting of a product of the larval salivary glands and indicating that the cells have been inhabited by a pupa. In addition the damaged cell contains, attached to the proximal end or bottom, some remains of a cocoon which is certainly not the product of an *Anischnogaster* larva; perhaps the original inhabitant has been parasitized, or the open cell may have been used by some other insect.

Anischnogaster laticeps spec. nov.

A nest of this species collected with two females in or near Bernhard Camp (see p. 250) consists of four open cells, attached to a thin rootlet (fig. 59). It is entirely made of brown and yellowish vegetable matter, probably masticated bark and wood. The first cell was attached under a sharp angle to the rootlet and has a small solid cone at the place of attachment, the second cell (not visible in the figure) was fixed to it on a slightly



Figs. 57-60. Nests of *Anischnogaster* (3 × natural size). 57, mud nest of *A. iridipennis*, collected with 1 ♀, Araucaria Camp, 27 March 1939, L. J. Toxopeus. 58, mud nest of *A. iridipennis* from the collection of Miss L. E. Cheesman, Waigeo or New Guinea; the broken line indicates remains of a damaged cell; only the three cells on the left hand side, including the closed cell, are directly attached to the branch (the drawing does not show the original position of the cells, which probably had their openings more or less directed downwards). 59, nest made of vegetable material by *A. laticeps* spec. nov., collected with two ♀♀, Bernhard Camp, 6 April 1939, L. J. Toxopeus; broken lines indicate the place of the bottom of the central cell and the probable original shape of damaged cells. 60, nest made of vegetable material by unknown *Anischnogaster* species, from the collection of Miss L. E. Cheesman, Waigeo or New Guinea.

lower level, and cells 3 and 4 were constructed in the grooves between cells 1 and 2, again on a somewhat lower level. The structure thus shows great similarity with the four-cell stage of several true social wasps (Polistinae and Vespinae), the main difference being the non-petiolate first cell, a character apparently common to all Stenogastrinae. The cells are rather smooth within, but on the outer side the surface is rough, showing several small protuberances and other irregularities.

It seems possible that one of the females belonging to this nest had emerged from the first cell before the nest was collected, but the cell does not show distinct traces of having contained a pupa.

Anischnogaster spec.?

The nest figured under no. 60 also forms part of the collection of Miss L. E. Cheesman (BM). No information on its origin is available.

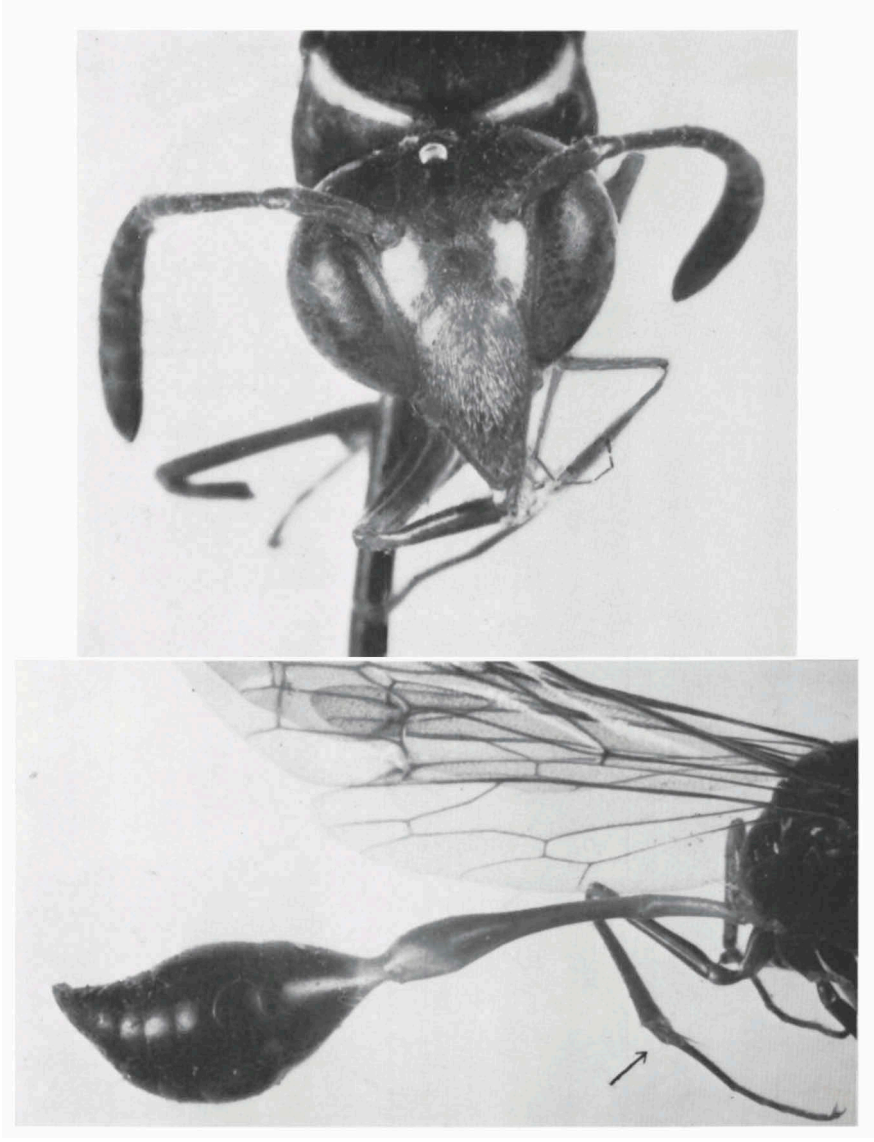
All the cells are separately attached to a yellowish fiber, and only two of them are closely fixed to each other. The largest cell, the lowest on the figure, is the only one which shows traces of having contained a pupa. The cells are made of the same material as those of the nest of *A. laticeps*, and also agree in shape and in mode of attachment. Moreover this is the only species which was collected by Miss Cheesman beside *A. iridipennis*. Yet the arrangement of the cells is so different from that of the nest described above, that the identity of the builder of the nest must be regarded as uncertain.

References

IWATA, K., 1967. Report of the fundamental research on the biological control of insect pests in Thailand. II. The report on the bionomics of Aculeate wasps — Bionomics of subsocial wasps of Stenogastrinae (Hymenoptera, Vespidae). — Nature and Life in Southeast Asia, 5: 259-293, 10 figs., 4 pls.

RICHARDS, O. W., 1962. A revisional study of the Masarid wasps (Hymenoptera, Vespoidea). — British Museum (Natural History), 294 pp., 241 figs.

YOSHIKAWA, K., R. OGUSHI & S. F. SAKAGAMI, 1969. Preliminary report on the Osaka City University 5th Scientific Expedition to Southeast Asia 1966, with descriptions of two new genera of stenogasterine wasps by J. van der Vecht. — Nature and Life in Southeast Asia, 6: 153-182, 4 figs., 75 photographs.



Type of *Ischnogaster loriai* Buysson, ♂, Mus. Genova; the arrow on the lower photograph points to the basitarsal organ.
Photographs by courtesy of Dr. Delfa Guiglia, 1957.