

The Aculeate Hymenoptera of Micronesia
I. Scoliidae, Mutillidae, Pompilidae and Sphecidae

By **KARL V. KROMBEIN**

Bureau of Entomology and Plant Quarantine, Agricultural Research
 Administration, United States Department of Agriculture

(Presented by Mr. Van Zwaluwenburg at the meeting of November 9, 1948)

Prior to World War II the aculeate Hymenoptera fauna of Micronesia had received scant attention. Aside from scattered descriptions of individual species only a few papers have dealt with all the fauna of any island or group of islands. The earliest faunistic paper of any importance is the brief list of Guam Hymenoptera by D. T. Fullaway in 1913, which contains thirteen species of bees and wasps, less than half of them being determined to species. The collecting expeditions of the Japanese entomologists, T. Esaki and K. Yasumatsu formed the basis for a series of papers by the latter on the bees and wasps. The bees of the joint Bishop Museum-Japanese Government expedition to the Caroline Islands in 1936 were treated by T. D. A. Cockerell, who also contributed papers on the bees of Guam and Rota Island collected by O. H. Swezey, E. H. Bryan, Jr., and R. L. Usinger. O. H. Swezey also contributed a short paper on the wasps of Guam. A bibliography of the papers dealing with Micronesian wasps is included at the end of this paper.

It is my intention to bring together the information contained in the scattered papers referred to above, as well as to record a number of new endemic species and recently introduced species. The amount of material available for study has been considerably greater than that used by any previous investigator and comes from a wider range of islands.

In spite of this wealth of material, there are still gaps in our knowledge. Several species are known from only one sex. Probably a few endemic species have escaped collection, and undoubtedly additional species will be introduced, intentionally or accidentally. In a few cases, such as *Pison korrorense*, the material at hand has been too limited to permit a final decision as to whether the form should be accorded specific or subspecific rank. Almost nothing is known of the habits of the species discussed. Whenever any biological facts have been recorded, even though based on extralimital observations, they have been noted in the discussion of the particular species.

I have assumed that many species were introduced into Micronesia during the war years owing to the great increase in surface and air shipping during that period. This assumption is supported by positive evidence only with respect to Guam, where there was a good deal of pre-war collecting. Swezey's (1942) list of the Guam wasps included collections through 1936. It is significant that no *Sceliphron* were taken—two species are now established

on Guam, and it is known that one of them, *laetum*, accompanied a convoy from the Solomons to Guam in 1945. These are large conspicuous insects, which could not have failed to attract attention if they had been established prior to the war. Other late-comers to Guam not taken in pre-war collections are *Tachysphex bengalensis* and *Motes laboriosus*.

Without question the outstanding collection of Micronesian aculeates, considering both the number of individuals and the number of species, was that made during the economic survey of Micronesia by the U. S. Commercial Company from May to August 1946. The entomologists of this expedition, H. K. Townes and R. G. Oakley of the Bureau of Entomology and Plant Quarantine, visited about 20 islands or island groups, and collected on all important groups in Micronesia, with the exception of the northern Marianas and the Gilbert Islands. A total of about 500 bees and wasps was obtained, and the thoroughness of the field work is attested to by the fact that nearly every species previously reported was included, as well as many others, some new and some recently introduced. The number of species represented is extraordinary considering the limited time which was available on most islands.

This material has been supplemented by several smaller lots, some collected by entomologists during their military service in the Pacific, and a post-war collection made by K. L. Maehler, of the Bureau of Entomology and Plant Quarantine. The material obtained by H. S. Dybas in 1948 in the Palaus and Ponape has not been available, but it is hoped that a study of this can be included as an appendix in Part II of the present paper.

The bees will be treated in Part II, which I hope to complete during the next year. The present section treats all families of wasps known to be present in Micronesia, with the exception of the Vespidae. This family would have been included if J. C. Bequaert had not already made a great deal of progress on his projected monograph of the Vespidae of Oceania. Since duplication of effort seemed unnecessary I have turned over to Dr. Bequaert all my material in this particular family.

Keys are presented for the ready identification of the families, genera and species at present occurring in Micronesia. Any specimen which fails to agree with the characters ascribed to a particular species, either in the keys or descriptions of new species, should be viewed with some suspicion, since it may belong to endemic or introduced species not included herein.

The synonymy listed under each species includes all references to that species based on material from Micronesia. In introduced species, the original descriptions of all synonyms, where there are any, are given also, even though these references may not have been based on material from Micronesia.

All Micronesian material listed is at present in the United States National Museum, except where specified by abbreviations in brackets following the locality data. Other collections from which

material has been examined and the abbreviations used for each such collection are as follows:

- Bernice P. Bishop Museum [BPB]
 Hawaiian Sugar Planters' Association [HSPA]
 K. V. Krombein, personal collection [KVK]
 K. L. Maehler, personal collection [KLM]

Wherever possible, duplicates of each species will be deposited in the collection of the B. P. Bishop Museum, Honolulu.

Thanks are due to F. X. Williams for valuable information on Oceanic *Pison* and the donation of several specimens from the Hawaiian Sugar Planters' Association. E. C. Zimmerman and R. H. Van Zwaluwenburg have assisted by arranging the loan of specimens from the B. P. Bishop Museum and Hawaiian Sugar Planters' Association. K. Yasumatsu has kindly sent a female paratype of his *Liris esakii*.

DISTRIBUTION OF MICRONESIAN WASPS

(An asterisk denotes an endemic or supposedly endemic species)

SCOLIIDAE

- ***Campsomeris (Campsomeris) palauensis** (Turner), Carolines (Palau)
Campsomeris (Campsomeris) annulata (Fabricius), Marianas (Guam, Rota, Saipan)
Scolia (Scolia) ruficornis Fabricius, Carolines (Palau)
Scolia (Triscolia) patricialis plebeja (Gribodo), Carolines (Palau)

MUTILLIDAE

- ***Timulla** species, Carolines (Palau)

POMPILIDAE

- Auplopus** species, Marianas (Guam)
Anoplius opulentus (Smith), Marianas (Guam, Tinian, Saipan), Carolines (Palau)
 ***Episyron maehleri** sp. n., Carolines (Palau)

VESPIDAE

The following species have been recorded from Micronesia by Bequaert and Yasumatsu, 1939 (*Tenthredo* 2: 314-328, pls. 5-8), Swezey, 1942 (B. P. Bishop Mus. Bul. 172: 186-187), Yasumatsu, 1945 (*Mushi* 16: 35-45, 2 figs.), and Townes, 1946 (Rpt. 14, U. S. Comm. Co. Surv. Micronesia, pp. 49-50), and are listed here for the sake of completeness.

- Polistes olivaceus** (DeGeer), Marianas (Guam, Rota, Saipan, Tinian)
 ***Polistes semiflavus** Holmgren, Marianas (Guam, Rota)
Ropalidia marginata sundaica van der Vecht, Marianas (Guam, Rota, Saipan, Tinian, Pagan), Carolines (Truk)

- Rygchium haemorrhoidale** var. **quinquecinctum** (Fabricius), Marianas (Guam, Rota, Saipan, Pagan)
Pachodynerus nasidens (Latreille), Marshalls (Kwajalein, Eniwetok, Majuro), Marianas (Guam), Carolines (Truk)
 ***Odynerus mariannensis** Bequaert and Yasumatsu, Marianas (Rota, Tinian [?])
 ***Odynerus paganensis** Yasumatsu, Marianas (Pagan)
 ***Odynerus saipanensis** Yasumatsu, Marianas (Saipan)
 ***Pseudonortonia esakii** Bequaert and Yasumatsu, Carolines (Palau)
 ***Pseudonortonia palauensis** Bequaert and Yasumatsu, Carolines (Palau)
 ***Pseudonortonia yapensis** Yasumatsu, Carolines (Yap)

SPHECIDAE

- Chalybion bengalense** (Dahlbom), Gilberts (Tarawa)
Sceliphron laetum (Smith), Marianas (Guam), Carolines, (Palau)
Sceliphron madraspatanum (Fabricius), Carolines (Palau)
Sceliphron ceamentarium (Drury), Marshalls (Kwajalein), Marianas (Guam, Saipan, Tinian)
 ***Lestica (Solenius) constricta** sp. n., Carolines (Palau)
 ***Dasyproctus immaculatus** sp. n., Carolines (Palau)
Tachysphex bengalensis Cameron, Marianas (Saipan), Carolines (Palau)
Dicranorhina species, Carolines (Palau)
Motes subtesselatus (Smith), Marshalls (Kwajalein)
Motes laboriosus (Smith), Marianas (Guam, Tinian, Saipan)
Motes manilae (Ashmead), Marianas (Guam, Saipan, Pagan), Carolines (Truk, Palau)
 ***Motes townesi** sp. n., Carolines (Palau)
Liris opulenta (Lepeletier), Marshalls (Kwajalein), Marianas (Guam, Tinian, Saipan, Pagan), Carolines (Truk, Palau)
Liris samoensis Williams, Carolines (Ponape)
 ***Liris esakii** Yasumatsu, Carolines (Yap, Truk)
 ***Liris mindanaoensis carolinensis** Yasumatsu, Carolines (Truk)
 ***Liris williamsi** sp. n. Carolines (Palau)
Solierella rohweri (Bridwell), Marshalls (Eniwetok)
Trypoxylon philippinense Ashmead, Marianas (Guam)
Pison punctifrons Shuckard, Marshalls (Eniwetok), Marianas (Guam, Tinian, Saipan, Agrihan), Carolines (Kapingamarangi, Yap, Palau)
 ***Pison esakii** Yasumatsu, Marianas (Guam, Rota, Tinian)
 ***Pison nigellum** sp. n., Carolines (Ponape)
Pison argentatum Shuckard, Marianas (Guam), Carolines (Ponape, Truk)
Pison ignavum Turner, Carolines (Palau)
Pison hospes Smith, Marshalls (Ailinglapalap, Jaluit), Carolines (Palau)
Pison tahitense Saussure, Marshalls (Ailinglapalap)

- ***Pison ponape** sp. n., Carolines (Ponape)
 ***Pison oakleyi** sp. n., Marianas (Guam, Rota)
Pison iridipenne Smith, Marshalls (Ailinglapalap), Marianas (Tinian), Carolines (Kusaie, Ponape, Truk, Palaus)
 ***Pison korrorense** Yasumatsu, Carolines (Palaus)

It is of interest to note that only the high islands have developed endemic species. The low coral atolls have only a sparse, introduced fauna derived mainly from the Oriental region. Comparatively few of the introduced species on any of the islands reached there from the east. The complete distribution of the introduced species is considered in the discussion of each such species.

KEY TO THE FAMILIES OF MICRONESIAN ACULEATES¹

1. Pronotum reaching the tegulae, or the latter lacking entirely (a wingless female)..... 2
 Pronotum not reaching the tegulae, lateral surface with a rounded lobe covering spiracle..... 5
2. Second abdominal tergite with a narrow longitudinal band of dense appressed hairs (the "felt" line) near side; female wingless, the thorax a chitinous box, movable sutures lacking; hind wing of male without anal lobe..... **Mutillidae**
- Second tergite without such a "felt" line; females always winged, and hind wing in both sexes with an anal lobe.. 3
3. Apical third of wings lacking veins, the membrane striolate; femora and tibiae of females enlarged, fossorial, outer surface of tibiae with numerous close-set thorns..... **Scoliidae**
- Apical third of wings with veins in at least part of the area, the membrane not striolate; femora and tibiae of females not enlarged, the latter without numerous thorns..... 4
4. Forewing longitudinally folded when at rest; inner margin of eye deeply emarginate, the eye reniform in outline..... **Vespidae**²
- Forewing not longitudinally folded; inner margin of eye straight or only very slightly emarginate, not reniform in outline..... **Pompilidae**
5. None of body hairs branched or plumose, females without pollen-collecting apparatus; posterior basitarsus normally slender, not flattened nor broader than following segments..... **Sphecidae**

¹ Antennae 12-segmented in female, 13-segmented in male (12-segmented in one species, which has fore and mid tarsi strongly flattened and only one submarginal cell in forewing); abdomen with six visible segments in female, and usually seven in male.

² This family is not treated further in the present work.

At least some of body hairs branched or plumose, females usually with a specialized pollen-collecting apparatus, a scopa or corbiculum; posterior basitarsus usually flattened and broader than following segments.....

.....**Colletidae, Halictidae, Megachilidae, and Apidae**³

FAMILY SCOLIIDAE

The only endemic scoliid in this area is *Campsomeris* (*Campsomeris*) *palauensis* (Turner) of the Palau Islands. Several years ago *Campsomeris* (*Campsomeris*) *annulata* (Fabricius) was liberated on Guam, Saipan and Rota Islands in the Marianas, where it is now very common and apparently an important factor in the reduction of *Anomala sulcatula* Burmeister. In 1948 two other scoliids were liberated on the Palaus for control of the rhinoceros beetle, *Oryctes rhinoceros* (Linnaeus), namely *Scolia* (*Triscolia*) *patricialis plebeja* (Gribodo) from Malaya and *Scolia* (*Scolia*) *ruficornis* Fabricius from Africa.

The four species may be separated by the following key:

1. Forewing with two complete recurrent nervures, both received by the second submarginal cell (only two submarginal cells); mesopleuron sloping gradually from beneath wing base, without a distinct dorsal surface; sexual dimorphism marked, the male very slender
Campsomeris 2
- Forewing with only one complete recurrent nervure, this received by the second submarginal cell (two or three submarginal cells); mesopleuron with a shoulder beneath wing base having a distinct dorsal surface; sexual dimorphism not greatly developed, the male stocky
Scolia 3
2. ♀ ♀ : Integument entirely black, the abdominal tergites with conspicuous apical fringes of thick, pale hair; occiput, pronotum laterally, and median area of dorsal surface of propodeum with dense, conspicuous, erect white hair; wings hyaline, slightly infumated on basal two-thirds, deeply so on apical third. ♂ ♂ : Last two abdominal segments entirely black and with black pubescence; clypeus laterally yellow, the mesopleuron and lateral surface of propodeum without pale maculations; legs black with outer surface of fore and mid femora at tip, and fore and mid tibiae entirely yellow; short, dense, decumbent pubescence of thorax silvery; Marianas
Campsomeris (**Campsomeris**) **annulata** (Fabricius) (p. 374)
- ♀ ♀ : Head between compound eye and ocelli, pronotum, and abdominal tergites one to four with yellow markings, the latter with sparse apical fringes of orange

³ A key for these families of bees will be given in Part II of the present work.

hairs; occiput, pronotum laterally and median area of dorsal surface of propodeum with the erect hairs sparse, tinged with ferruginous; wings hyaline, uniformly infumated with yellowish. ♂♂: Last three abdominal segments ferruginous and with ferruginous pubescence; clypeus entirely, mesopleuron and lateral surface of propodeum extensively, yellow; legs ferruginous, much more extensively marked with yellow; short, dense, decumbent pubescence of thorax golden; Carolines (Palau)

.....
Campsomeris (Campsomeris) palauensis (Turner) (p. 373)

3. Forewing with two submarginal cells, very dark brown; dorsum of first tergite with a basal tubercle; hair of thorax and abdomen black, sparse and short; antennae orange; abdomen entirely black; Carolines (Palau)

.....**Scolia (Scolia) ruficornis** Fabricius (p. 375)

Forewing with three submarginal cells, lighter brown; dorsum of first tergite not tuberculate; hair of thorax (except mesoscutum and scutellum) and abdomen black, dense and long; antennae black; third tergite of abdomen with a pair of yellow maculations; Carolines (Palau)

.....**Scolia (Triscolia) patricialis plebeja** (Gribodo) (p. 375)

Campsomeris (Campsomeris) palauensis (Turner)

Scolia (Dielis) palauensis Turner, 1911. Ann. Mag. Nat. Hist. (8) 7: 308; [♀, ♂; Palau; type in Deutsch Ent. Inst., Berlin].

Campsomeris (Dielis) palauensis (Turner) Betrem, 1928. Treubia, Suppl. vol. 9: 92.

Campsomeris palauensis (Turner) Uchida, 1933. Jour. Faculty Agr. Hokkaido Imp. Univ. 32: 257, pl. 2, fig. 15 [♀].—Bequaert and Yasumatsu, 1939. Tenthredo 2: 327.—Townes, 1946. Rpt. 14, U. S. Comm. Co: Surv. Micronesia, p. 48.

Campsomeris palauensis form *uchiyamai* Uchida, 1933. Jour. Faculty Agr. Hokkaido Imp. Univ. 32: 257, pl. 2, fig. 14 [♂; Palau; type in Sapporo, Hokkaido, Japan]. New synonym.

The extensive yellow maculations in both sexes and ferruginous apical segments of the male abdomen readily distinguish this sole endemic species from introduced species of Scoliidae.

Uchida's form *uchiyamai* seems to have been based on the typical male, as most specimens before me agree with his brief notes. The only respects in which Uchida's form differs from the descriptions by Turner and Betrem are that the antennae are dark brown beneath (Turner and Betrem mention only that the scape is yellow beneath—all my males have in addition the flagellum brownish beneath), and that there are two spots on the median dorsal area of the propodeum (there is variation in my specimens from those

with no markings to those with all intervening gradations of yellow markings).

I have examined the following material:

CAROLINE ISLANDS: 4 ♀ ♀, 24 ♂ ♂; Arakabesan Island, Palau; July 18, 1946 (H. K. Townes; on roadside vegetation). 3 ♂ ♂; northeast corner of Koror Island, Palau; July 22, 1946 (H. K. Townes). 1 ♂; Koror Island; March 15-25, 1948 (K. L. Maehler; in forest visiting flowers). 1 ♂; Peleliu Island, Palau; July 23, 1946 (H. K. Townes). 3 ♀ ♀, 1 ♂; Peleliu Island; 1945 (C. K. Dorsey).

Campsomeris (Campsomeris) annulata (Fabricius)

Tiphia annulata Fabricius, 1793. Ent. syst. 2: 225 [♀; China; type in Kiel (?)].

Campsomeris Servillii Lepeletier, 1845. Hist. nat. ins. Hym. 3: 501 [♀; Java; type in Paris (?)].

Campsomeris (Dielis) annulata (Fabricius) Betrem, 1928. Treubia, Suppl. vol. 9: 94, pl. 2, fig. 11 [♀, ♂; redescription and distributional notes].

Campsomeris annulata (Fabricius) Townes, 1946. Rpt. 14, U. S. Comm. Co. Surv. Micronesia, p. 48 [common in southern Marianas].

This species has a wide distribution in Japan, Korea, China, India and the East Indies. In Korea it is parasitic on several species of *Anomala* and *Popillia* larvae. Efforts to establish it in eastern North America in 1925 and 1926 for control of *Popillia japonica* Newman were unsuccessful. It is now extremely abundant in the southern Marianas and appears to be a potent factor in reduction of the *Anomala sulcatula* population.

I have examined the following material from Micronesia:

MARIANA ISLANDS: 2 ♀ ♀, 3 ♂ ♂; Point Ritidian, Guam; June 1945 (J. L. Gressitt). 3 ♂ ♂; same data, but March 7, 1948 (K. L. Maehler; on *Ipomoea pes-caprae*). 1 ♂; Mount Santa Rosa, Guam; June 1945 (J. L. Gressitt and G. E. Bohart). 1 ♂; Yigo, Guam; March 9, 1948 (K. L. Maehler). 1 ♀, 1 ♂; Dededo, Guam; December 24, 1947 (K. L. Maehler). 1 ♀, 1 ♂; Point Oca, Guam; May 1945 (J. L. Gressitt and G. E. Bohart). 1 ♂; same data, but December 20, 1945 (J. L. Gressitt; at light). 1 ♂; Ukudu, Guam; January 3, 1945 (J. L. Gressitt and G. E. Bohart). 1 ♀; Haputo Point, Guam; March 14, 1948 (K. L. Maehler). 1 ♂; Agaña, Guam; May 23, 1945 (J. L. Gressitt and G. E. Bohart). 1 ♂; same data, but August 4, 1945 (J. L. Gressitt). 1 ♀; same data, but January 30, 1948 (K. L. Maehler; on *Ipomoea*). 1 ♀, 6 ♂ ♂; Mount Alutom, Guam; June 6, 1946 (H. K. Townes). 7 ♂ ♂; same data, but June 18, 1946 (H. K. Townes). 2 ♂ ♂; Rota, Rota; June 20, 1946 (H. K. Townes; beginning to roost gregariously on *Casuarina equisetifolia* at sundown). 1 ♂; same data, but June 23,

1946 (H. K. Townes). 6 ♂♂ ; Oscilita, Rota : June 27, 1946 (R. G. Oakley). 1 ♂ ; native settlement, Saipan ; June 18, 1946 (R. G. Oakley). 1 ♂ ; Susupe, Saipan ; January 2, 1948 (K. L. Maehler). 1 ♂ ; Hagoya Lake, Tinian ; June 10, 1946 (H. K. Townes).

Scolia (Scolia) ruficornis Fabricius

Scolia ruficornis Fabricius, 1793. Ent. syst. 2: 230 [♂ ; Senegal ; type in Paris (?)].

About 150 specimens of this African species were liberated in the Palaus in 1948 for control of *Oryctes rhinoceros* (Linnaeus). No reports have been received yet as to whether the species has become established.

I have included it in the key on the basis of specimens from Africa.

Scolia (Triscolia) patricialis plebeja (Gribodo)

Triscolia patricialis var. *plebeja* Gribodo, 1893. Bul. Soc. Ent. Ital. 25: 168 [♀ , ♂ ; Borneo, Malacca ; type in Genoa].

Scolia (Triscolia) patricialis plebeja (Gribodo) Betrem, 1928. Treubia, Suppl. vol. 9: 235.

About 100 specimens of this wasp collected by T. R. Gardner in Malaya were liberated in the Palaus in 1948 for the control of *Oryctes rhinoceros*. Recently D. B. Langford, Staff Entomologist of the Trust Territory, wrote C. P. Clausen, of the Bureau of Entomology and Plant Quarantine, that he had seen specimens of this wasp in the field several months after liberations, an indication that the species is becoming established.

I have not examined specimens of the atypical subspecies *plebeja*, but have seen two females of the typical subspecies from North Borneo. These females have the head above antennae, scutellum, postscutellum, median dorsal surface of propodeum, median spot on dorsum of first abdominal tergite, and basal band on third tergite, orange. These specimens agree with Betrem's interpretation of *patricialis patricialis*. Betrem separates *patricialis plebeja* by the reduction or total absence of yellow markings on the thorax and first abdominal tergite.

FAMILY MUTILLIDAE

Esaki, 1938 (Annot. Zool. Jap. 17: 431-2, fig.) records a female of the New Guinea *Timulla (Trogaspidia) albertisi* (André) from Ashiasu, Peleliu, Palau Islands. I view this determination with a great deal of suspicion, especially since Esaki states (*italics mine*), "My specimen agrees very well with the description of André (1896), *except for some details of the pubescence*." Females in this genus are very difficult to determine, and separation depends in many cases on seemingly minute differences in the pubescence. Unfortunately Esaki does not mention what these differences are. Even though the wingless females in this genus are frequently carried in flight by the males during mating, I regard it as extremely

unlikely that the New Guinea species could become established in the Palau in this way. In all probability the Palau form represents a discrete new species, but lacking material I am unable to carry the matter any further. Esaki has assigned the species to the correct genus, as his photograph is unmistakably that of a *Timulla*.

The female may be readily recognized by being wingless, about 10 mm. long, black with a pair of oval spots on the second abdominal tergite and a broad transverse band on the third tergite, both of pale, appressed pubescence. The male is unknown, but males of this genus are winged, have reniform compound eyes, large tegulae, and a sessile first abdominal segment.

FAMILY POMPILIDAE

These wasps, popularly known as spider wasps from their habit of provisioning the cells for the young with paralyzed spiders, are poorly represented in Micronesia. Apparently the only endemic species is the new *Episyron* from the Palau described below. In addition, there is the oceanic vagrant, *Anoplius opulentus* (Smith), which became established during and after the war in the Marianas and Palau, and an *Auplopus* (*olim Pseudagenia*) probably introduced on Guam (my single specimen is in too poor condition for specific identification).

The three specimens before me may be separated by the following key:

1. Subdiscoidal vein of forewing meeting discoidal vein at a right angle so that third discoidal cell does not have a pocket at base. ♀ ♀ : Second abdominal sternite with a deep transverse groove before middle; pygidium a flattened, oval, shining or shagreened area. ♂ ♂ : First abdominal segment very slender and elongate, in length somewhat over four times the width at base; Marianas (Guam).....**Auplopus** species (p. 377)
- Subdiscoidal vein of forewing abruptly angulate at base and meeting discoidal vein at an acute angle so that the third discoidal cell has a distinct pocket at base. ♀ ♀ : Second abdominal sternite without a transverse groove; pygidial area not delimited, the last tergite uniformly convex and clothed with erect bristles. ♂ ♂ : First abdominal segment much broader, its length not over three times the width at base
2. Pale integumental maculations lacking except on seventh tergite of male, the entire body strikingly ornamented with numerous spots of appressed silvery pubescence, none of pubescence consisting of modified scale-like setae; wings dusky, the tips darker; apical margin of clypeus subtruncate on middle two-thirds, mandibles not hidden by clypeus when head is viewed from in front. ♀ ♀ : Tarsal claws not cleft, but with a small erect tooth at middle. ♂ ♂ : Fourth abdominal sternite slightly con-

- cave, covered with dense, suberect hairs having kinky tips; hypopygium tectiform; Marianas, Carolines (Palau).....**Anoplius opulentus** (Smith) (p. 377)
- Clypeus, face, occiput, pronotum, hind tibia and second and third abdominal tergites with ivory integumental maculations; some pubescence on pronotum, postscutellum, propodeum, first abdominal segment (and base of second also in male) dense, appressed and scale-like; wings clear hyaline, tips dusky; apical margin of clypeus broadly rounded, mandibles almost completely hidden by clypeus when head is viewed from in front. ♀ ♀ : Tarsal claws cleft. ♂ ♂ : Fourth abdominal sternite convex, without differentiated hairs; hypopygium slightly convex; Carolines (Palau).....**Episyron maehleri**, new species (p. 378)

Auplopus species

I place here a single male from Point Oca, Guam; May 1945 (G. E. Bohart and J. L. Gressitt). The specimen is in deplorable condition, apparently having been mashed between the cork and lip of the collecting bottle, since the head is broken and most of the antennae and legs are missing. It is, however, recognizable as an *Auplopus* (*olim Pseudagenia*), because of the slender first abdominal segment and lack of a pocket at the base of the third discoidal cell of the forewing. I suppose it is an introduced species, as it was not taken on any of the earlier Guam surveys, but I am unable to match it with any of the available Philippine or North American species in the National Museum collection. However, males of only a few of the Philippine species are known.

Anoplius opulentus (Smith), new combination

Pompilus opulentus Smith, 1860. Jour. Proc. Linn. Soc. London, Zool. 5: 120 [♀ ; Batjan Island, Moluccas; type in Oxford].—Dalla Torre, 1897. Cat. Hym. 8: 308.

Pompilus elatus Smith, 1865. Jour. Proc. Linn. Soc. London Zool. 8: 82 [♀ ; Morotai Island, Moluccas; type in Oxford].—Dalla Torre, 1897. Cat. Hym. 8: 286.—Williams, 1945. Proc. Hawaii. Ent. Soc. 12: 436-7, fig. 11 [♀ , ♂ ; descriptive notes; various localities in New Caledonia].—Williams, 1947. Occas. Papers B. P. Bishop Mus. 18: 326 [quotes Turner's Fiji record]. New synonymy.

Pompilus manokwariensis Cameron, 1906. Res. Exped. Neerl. Nov. Guin. 5: 55 [♀ ; Manokwari, Dutch New Guinea; type in Amsterdam]. New synonymy.

Pompilus inquirendus Vachal, 1907. Rev. d'Ent. 26: 117 [♀ , ♂ ; New Caledonia; type in Paris]. New synonymy.

Psammochares elatus (Smith) Turner, 1917. Trans. Roy. Ent. Soc. London, 1917, p. 73 [records from Mackay and Townsville, Queensland, Australia].—Turner, 1919. Trans. Roy.

Ent. Soc. London, 1918, p. 340 [records from Fiji and New Caledonia; also synonymizes *inquirendus* Vachal].

Anoplinellus minor Banks, 1941. Occas. Papers B. P. Bishop Mus. 16: 243, fig. 1 h [♀, ♂; Fulakora (?) and Auki, Malaita Island, Solomons; type in Honolulu]. New synonymy.

Pompilinus (?) sp., Williams, 1945. Proc. Hawaii. Ent. Soc. 12: 425 [♂; Saipan].

Psammocharidae sp. Townes, 1946. Rpt. 14, U. S. Comm. Co. Surv. Micronesia, p. 50 [Palau and Marianas].

Apparently the nesting habits of this wasp are such that it has been readily transported by commerce in the past, and with the advent of air travel the adults themselves are probably being transferred to new localities. It seems likely that this species came originally from the East Indies and reached by successive steps New Guinea, Australia and the Solomon Islands. The colonies in the Palau and Marianas reported below seem to have been established by air transport during the war, in part at least, for H. K. Townes informs me that specimens were found most commonly in the vicinity of airfields.

The new synonymy listed above is based almost entirely on the original descriptions. The pattern of silvery pubescence is quite striking, and is mentioned by each of the authors. At my request H. K. Townes kindly made notes on the male allotype of *Anoplinellus minor* Banks at the Museum of Comparative Zoology at Harvard College which further confirmed my suspicion as to the identity of that species.

I have seen specimens from New Caledonia, New Guinea and the Solomons, in addition to those from Micronesia listed below:

MARIANA ISLANDS: 1 ♀; Mt. Lasso, Tinian; June 9, 1946 (H. K. Townes). 1 ♀; Tinian; June 11, 1946 (R. G. Oakley). 1 ♂; Charan Kanoa, Saipan; August 20, 1944 (D. G. Hall). 1 ♂; U. S. Commercial Co. farm, Saipan; June 17, 1946 (R. G. Oakley). 1 ♀; Susupe, Saipan; January 1, 1948 (K. L. Maehler). 1 ♀; Agaña airport, Guam; May 23, 1948 (K. L. Maehler).

CAROLINE ISLANDS: 2 ♀ ♀, 2 ♂ ♂; Peleliu Island, Palau; July 23, 1946 (H. K. Townes).

Episyron maehleri,⁴ new species

Psammocharidae sp. Townes, 1946. Rept. 14, U. S. Comm. Co. Surv. Micronesia, p. 50 [Palau].

The present species seems closest to the Bombay, India, *decoratus* (Smith), and may be identical with the female recorded as *decoratus* from Formosa by Yasumatsu, 1937 (Mushi 10: 72). Females of both species agree in being more or less shining, and in having the clypeus broadly rounded apically and the short

⁴ For K. L. Maehler, Division of Foreign Plant Quarantine, Bureau of Entomology and Plant Quarantine, whose collections in Micronesia have added much to the completeness of the present paper.

tarsal comb. However, they differ in several details of coloration which seem of specific importance. Thus, *decoratus* is essentially a more extensively maculated species, having ivory maculations along the inner and outer eye margins, posterior margin of pronotum, posteriorly on the mesoscutum, on the mesopleuron below the wing base, at base of hind tibia, a pair of lateral spots on the second and third abdominal tergites, and a fascia at the base of the fifth tergite, but the clypeus is entirely black; *maehleri* is much less extensively maculated with ivory, lacking spots on the mesoscutum, mesopleuron and fifth tergite, but the third tergite has a broad fascia instead of lateral spots, and the clypeus is entirely pale except for the narrow apical margin and a quadrate mark at the base. The scutellum in *maehleri* is very prominently gibbose and the interocellar area is flat; these characters are not mentioned in the descriptions of *decoratus*. *E. maehleri* is distinguished from any of the known Philippine species by the combination of characters listed above.

Type: ♀; northeast corner of Koror Island, Palau; July 22, 1946 (H. K. Townes; in native forest on rough limestone rocks). [U. S. National Museum, Type No. 59034.]

Female—Length 9 mm. (apical abdominal segments somewhat telescoped), forewing 9 mm. Black, shining, with dark blue reflections in certain lights; mandible ferruginous near tip; clypeus except narrow apical margin and quadrate basal mark, a band (broader below) along inner eye margin from base of clypeus to a point opposite anterior ocellus, narrower band along outer eye margin, band on pronotum extending from tubercles, narrowed toward middle and slightly interrupted there, small spot near base of hind tibia externally, rounded anterolateral spot on second tergite emarginate behind, and broad fascia at base of third tergite emarginate at middle of posterior margin, ivory. Wings hyaline, iridescent, tip of forewing infumated, veins fuscous. Body rather evenly covered with short, moderately dense sericeous pubescence having slight silvery reflections in certain lights; the head, thorax, coxae beneath, and abdomen with short, erect dark hairs, denser on head and fore coxae than on thorax, extremely sparse on abdomen; in addition, the pronotum, side of scutellum, postscutellum, propodeum and first abdominal tergite with appressed, short scales having silvery to pale greenish blue reflections, dense on first tergite, more scattered elsewhere.

Head in anterior aspect subcircular, flattened across the top, its greatest width 1.14 times the height from apical margin of clypeus to top of head; mandibles almost entirely covered by the large clypeus; apical margin of clypeus very broadly rounded, not reflexed nor impunctate, its length in middle half the greatest width; eyes strongly convergent posteriorly, the interocular distance at hind ocelli narrow, equal to the length of the second flagellar segment and only 0.54 times the interocular distance at base of clypeus; interocellar area flat, the ocelli in a low triangle, the postocellar distance 1.7 times the ocellular distance; antennae long and slender, the scape, pedicel and first two flagellar segments in a ratio of about 3:1:5:3.

Pronotum evenly and shallowly arcuate posteriorly; scutellum strongly gibbose, flattened anteriorly in the middle, the sides and posterior abruptly declivous.

Anterior coxa and trochanter together as long as mesopleuron; anterior tarsus with a comb of short spines, the basitarsus with three spines, none of them longer than second tarsal segment; pulvillar comb consisting of about nine moderately long, subparallel setae.

Forewing with third submarginal cell strongly narrowed above, its width

on radial vein half its width on cubital, basal and transverse median veins interstitial; cubitus in hind wing interstitial with transverse median vein.

Allotype: ♂; Koror Island, Palau; March 15-25, 1948; (K. L. Maehler). [U. S. National Museum.]

Male—Length 7 mm., forewing 6 mm. Coloration and pubescence as in female with the following exceptions: Clypeus black, hind tibia ivory on basal half externally and ferruginous beneath, anterolateral ivory spot on second tergite very much reduced in size, fascia on third tergite broadly interrupted in middle, second tergite with some scattered, short appressed scales.

Head in frontal view tending toward subcordate, flattened above, its greatest width 1.16 times the height from apex of clypeus to top of head, mandibles almost completely covered by the large clypeus; apical margin of clypeus rounded, though tending toward subtruncate on median two-thirds, not reflexed, the length in middle half the greatest width; eyes not so strongly convergent above as in female, the interocular distance across narrowest part of vertex 0.88 times the interocular distance at base of clypeus and over twice the length of the second flagellar segment; ocelli in a low triangle, the interocellar area flat, the postocellar distance 0.8 times the ocellocular distance; antennae shorter and stouter than in female, the scape, pedicel and first two flagellar segments in a ratio of about 3:1:3:3.

Thorax much as in female, the scutellum not quite so prominently gibbose. Hypopygium slightly convex, the apex broadly rounded.

FAMILY SPHECIDAE

Key. to the Micronesian Species

1. Forewing with one or three submarginal cells, if with three, the second never petiolate above; inner margin of compound eye not deeply emarginate except in *Trypoxylon philippinense* which has only one submarginal cell 2
- Forewing with three submarginal cells, the second petiolate above; inner margin of compound eye deeply emarginate except in *Solierella rohveri*..... 18
2. Abdomen basally with a long, slender petiole composed of first sternite only, the first tergite a small cap at apex of segment, the petiole longer than remainder of abdomen; large, slender, metallic blue or black and yellow forms, 15 mm. or more in length..... 3
- Abdomen usually sessile, if petiolate (*Trypoxylon philippinense*, *Dasyproctus immaculatus* and *Dicranorhinus* sp.) the petiole consisting of both tergite and sternite and not as long as rest of abdomen; smaller species, not metallic blue, entirely without yellow maculations except in *Lestica constricta*, not over 10 mm. in length.... 6
3. Apical margin of clypeus tridentate in middle; dorsum of propodeum not set off from lateral and posterior surfaces by a U-shaped groove; metallic blue; Gilberts (Tarawa) ***Chalybion bengalense*** (Dahlbom) (p. 386)
- Apical margin of clypeus truncate in middle or with a narrow central emargination dividing the middle section into two rounded lobes; dorsum of propodeum set off from lateral and posterior surfaces by a deep U-shaped groove; black and yellow forms. *Sceliphron*..... 4

4. Viewed from above the hind coxa rectangulate at base on outer margin; side of propodeum impunctate between the oblique rugae; female with apex of fourth abdominal tergite and last two segments entirely, male with apices of fourth and fifth, and sixth and seventh tergites entirely, yellow; Marianas, Carolines (Palau).....
**Sceliphron laetum** (Smith) (p. 386)
- Viewed from above the hind coxa rounded at base on outer margin; side of propodeum punctate between the oblique rugae; apex of abdomen entirely black..... 5
5. Sides of thorax dull; erect hair of head and thorax dark brown except on yellow maculations; hind trochanter and femur, and petiole of abdomen black; first tergite usually yellow in part; Marshalls, Marianas.....
**Sceliphron caementarium** (Drury) (p. 388)
- Sides of thorax shining; erect hair of head and thorax pale; hind trochanter, basal half of hind femur and abdominal petiole, yellow; first tergite entirely black; Carolines (Palau)....**Sceliphron madraspatanum** (Fabricius) (p. 387)
6. Forewing with one submarginal cell; hind ocelli normal, circular, convex 7
 Forewing with three submarginal cells; hind ocelli distorted, flattened, subovate 9
7. Inner margin of compound eye deeply emarginate; elongate slender form with petiole of first abdominal segment slightly longer than hind tibia; abdomen red and black; Marianas (Guam)
**Trypoxylon philippinense** Ashmead (p. 400)
- Inner margin of compound eye straight; short, stocky forms with first segment of abdomen sessile or subpetiolate; abdomen immaculate or black and yellow..... 8
8. Dull, mat, nearly impunctate, immaculate form with first segment of abdomen subpetiolate (more strongly so in male) and somewhat nodose at apex, the other abdominal segments not noticeably constricted at base and apex; antennal scape bicarinate beneath; legs of male not modified; Carolines (Palau).....
**Dasyproctus immaculatus**, new species (p. 392)
- Shining, coarsely and closely punctate form with abundant yellow maculations, the first abdominal segment sessile, not nodose at apex, the second to fifth segments noticeably constricted at base and apex; antennal scape ecarinate beneath (male) or weakly unicarinate (female); legs of male greatly modified, the fore femur flattened beneath and densely hairy, the fore and mid tarsi strongly flattened; Carolines (Palau).....
**Lestica (Solenius) constricta**, new species (p. 389)
9. Front along margin of eye not swollen; posterior ocelli oblique in position; pronotum with a distinctly dorsal

- posterior surface, the mesoscutum not overhanging the pronotum; Marianas, Carolines (Palaus).....
**Tachysphex bengalensis** Cameron (p. 393)
- Front along margin of eye with a longitudinal swelling; posterior ocelli transverse in position; pronotum without a distinct dorsal surface posteriorly, more or less overhung by the mesoscutum..... 10
10. Mandible with a conspicuous tooth beneath near base..... 11
 Mandible not toothed beneath near base. *Liris*⁵..... 15
11. First abdominal segment petiolate, the apex much narrower than the width of the second segment; top of head flattened, the anterior ocellus not in a depression; Carolines (Palaus).....**Dicranorhina** species (p. 394)
 First abdominal segment sessile apically, not narrower than the base of the second segment; top of head with a broad depressed area around the anterior ocellus. *Motes*..... 12
12. Entire body dull through excessively fine, dense punctation, the individual punctures on thorax not resolvable under 48 diameters magnification; dorsum of propodeum either very faintly or not at all rugosoreticulate; hind femur in male excavate beneath near base..... 13
 Body shining, the punctures larger and resolvable at as low as 10 diameters magnification; dorsum of propodeum coarsely rugosoreticulate; hind femur of male rounded beneath 14
13. Side of propodeum with oblique rugae developed to some extent. ♀ ♀ : Wings not infumated with yellow; apical third of clypeus shining and practically impunctate. ♂ ♂ : Concave part of under surface of fore femur with short, dense, appressed silvery hairs; apical margin of clypeus rounded outwardly in middle; Marshalls.....
**Motes subtesselatus** (Smith) (p. 394)
 Side of propodeum not at all rugose. ♀ ♀ : Wings strongly infumated with yellow; clypeus punctate almost to apical margin, with only a very narrow, shining, impunctate rim. ♂ ♂ : Concave part of under surface of fore femur with dense, longer, suberect silvery hairs; apical margin of clypeus subtruncate in middle; Marianas.....
**Motes laboriosus** (Smith) (p. 394)
14. Thoracic punctation relatively dense, most of those on mesopleuron separated by not more than the diameter of a puncture. ♀ ♀ : Pygidial punctation contiguous, interspaces not noticeable. ♂ ♂ : Paramere of genitalia abruptly narrowed at middle, the apical half more slender; Marianas, Carolines..**Motes manilae** (Ashmead) (p. 395)
 Thoracic punctation comparatively much sparser and

⁵ *Liris mindanaoensis carolinensis* Yasumatsu is not included in this key. See discussion of this species below.

- finer, most of those on mesopleuron separated by several times the diameter of a puncture. ♀♀ : Pygidial punctation sparser, the interspaces noticeable. ♂♂ : Paramere more gradually narrowed, the apical half not as slender as in above species; Carolines (Palau)
 **Motes townesi**, new species (p. 396)
15. Head with a short horizontal section behind eyes; head and thorax with abundant, appressed golden pubescence; antennal scape, tegula and legs except coxae and trochanters, ferruginous; anterior tibia with a row of spines above; Marshalls, Marianas, Carolines.....
 **Liris opulenta** (Lepeletier) (p. 397)
- Head abruptly declivous behind top of eyes; head and thorax with the pubescence sparse, silvery, and usually suberect; entirely black; anterior tibia not spinose above..... 16
16. Dorsum of propodeum with stronger carinae curving outwardly; mesoscutal punctation sparser posteriorly, most of punctures there separated by more than the width of a puncture; wings strongly infumated with brown and with violaceous reflections; pygidial pile of female dark brown; male with carinae on lateral surface of propodeum practically absent; Carolines (Truk, Yap).....
 **Liris esakii** Yasumatsu (p. 397)
- Dorsum of propodeum with much weaker, oblique carinae; mesoscutal punctation denser posteriorly than in *esakii*, most of the punctures separated by distinctly less than the width of a puncture; wings either hyaline with the extreme tips darker (*williamsi*), or infumated (*samoensis*) though less strongly so than in *esakii*..... 17
17. Wings clear hyaline, the extreme tips slightly darkened, and with iridescent reflections; posterior surface of propodeum dull, scabrous; pygidial pile of female dark brown; male unknown; Carolines (Palau).....
 **Liris williamsi**, new species (p. 398)
- Wings moderately infumated with yellowish brown, and with violaceous reflections; posterior surface of propodeum shining, not scabrous; pygidial pile of female pale golden; male with well-developed carinae on part of lateral surface of propodeum; Carolines (Ponape).....
 **Liris samoensis** Williams (p. 398)
18. Inner margin of compound eye straight; marginal cell truncate at apex; size small, not over 4.5 mm. long; Marshalls..... **Solierella rohweri** (Bridwell) (p. 399)
- Inner margin of compound eye deeply emarginate in middle; marginal cell acute at apex; size larger, rarely less than 5.5 mm. long. *Pison*..... 19
19. Front with large contiguous punctures; thorax with rather dense, large punctures, the interspaces shining; dorsal surface of propodeum with strong, oblique carinae;

- hypopygium of male broadly and deeply emarginate at apex, the lateral arms long and slender; Marshalls, Marianas, Carolines.....**Pison punctifrons** Shuckard (p. 400)
- Front and thorax with smaller, usually more scattered punctures, the interspaces on thorax usually dull, shining in only a few species; dorsal surface of propodeum smooth and sparsely to rather densely punctate, or if obliquely carinate, the carinae very fine; hypopygium of male truncate or with a very shallow emargination at apex; the lateral arms very short..... 20
20. Head and thorax with the erect pubescence dense and black 21
- Head and thorax with the erect pubescence either entirely lacking or dense but when present always silvery except brownish on mesoscutum in *ponape*..... 22
21. Lateral surface of propodeum separated from dorsal and posterior surfaces by a strong carina extending from the spiracle almost to the apex; median carina on dorsal surface of propodeum strong, complete, and contained in a moderately deep sulcus; clypeal lobe semi-circular in outline; wings infuscated with dark brown and with violaceous reflections; larger, ♀ 9-11 mm. long; Marianas.....**Pison esakii** Yasumatsu (p. 401)
- No such carina separating the lateral from dorsal and posterior surfaces of propodeum; median carina on dorsal surface of propodeum very weak, evanescent posteriorly, and contained in a very weak, shallow sulcus; clypeal lobe more or less pentagonal in outline; wings hyaline and with iridescent reflections; smaller, ♀ 8 mm., ♂ 7.2 mm. long; Carolines (Ponape).....**Pison nigellum**, new species (p. 401)
22. Decumbent silvery pubescence on clypeus so dense that it obscures the punctation; second recurrent vein of forewing received in middle of second submarginal cell; tibial calcaria pale..... 23
- Clypeal pubescence sparser, not obscuring the punctation; second recurrent vein of forewing interstitial with second transverse cubital vein or received in third submarginal cell near base; tibial calcaria black..... 24
23. Smaller forms, average length of ♀ 6.0 mm., of ♂ 5.0 mm.; oblique carinae on dorsum of propodeum weaker, usually evanescent toward margins; apical margin of clypeal lobe of female not depressed in middle; punctation finer, though equally as dense; Marianas (Guam), Carolines (Ponape, Truk).....**Pison argentatum** Shuckard (p. 403)
- Larger forms, average length of ♀ 8.0 mm., of ♂ 7.0 mm.; oblique carinae on dorsum of propodeum stronger, usually complete to margins; clypeal lobe of female

- depressed in middle of apical margin giving it a bilobed appearance; punctation coarser; Carolines (Palau).....
**Pison ignavum** Turner (p. 404)
24. Mesopleuron with large, coarse, subcontiguous punctures, the interspaces shining; third sternite of male not tuberculate or ridged; ocellocular distance in female at least half the postocellar distance; larger, ♀ usually over 9 mm., ♂ over 8 mm. in length..... 25
- Mesopleuron with smaller punctures separated by at least the width of a puncture, the interspaces dull from shagreening except in *oakleyi*; third sternite of male tuberculate or ridged; ocellocular distance in female much less than half the postocellar distance; smaller, ♀ not over 8 mm., ♂ not over 7 mm. in length..... 27
25. Clypeal lobe triangular; second sternite densely punctate, the punctures separated by not much more than the diameter of a puncture; Marshalls, Carolines (Palau).....
**Pison hospes** Smith (p. 404)
- Clypeal lobe rounded or more or less pentagonal in outline; second abdominal sternite more sparsely punctate, the punctures separated by several times the diameter of a puncture..... 26
26. Dorsum of propodeum with median carina well-defined on at least the basal half, the median sulcus more or less evanescent on anterior half, but present posteriorly; posterior surface of propodeum finely, transversely rugulosopunctate; wings moderately infumated with brown and with faint violaceous reflections; Marshalls.....
**Pison tahitense** Saussure (p. 405)
- Dorsum of propodeum without a median carina, but the median sulcus deeper on entire length of surface; posterior surface of propodeum on lower half with about four strong transverse rugae, not punctate; wings clear hyaline and with iridescent reflections; male unknown; Carolines (Ponape).....
**Pison ponape**, new species (p. 405)
27. Mesopleuron shining, the impunctate interspaces not delicately shagreened; wings rather strongly infumated with dark brown and with violaceous reflections; third sternite of male with a small, low, rounded tubercle near middle; Marianas....**Pison oakleyi**, new species (p. 406)
- Mesopleuron opaque, the impunctate interspaces delicately shagreened; wings not infumated with brownish, the reflections iridescent; third sternite of male either with a short transverse ridge or a pair of mammilate tubercles in middle..... 28
28. Front finely granulate and with superimposed shallow punctures, the interspaces broader and not forming a network of fine carinae; third sternite of male with a

short transverse ridge in middle; Marshalls, Marianas, Carolines (Ponape, Truk, Palaus).....

Pison iridipenne Smith (p. 408)

Front with deeper, closer punctures, the interspaces very narrow and forming a network of fine carinae; third sternite of male with a pair of mammilate tubercles in middle; Carolines (Palaus).....

Pison korrorense Yasumatsu (p. 409)

Chalybion bengalense (Dahlbom)

Pelopoëus violaceus Lepeletier and Serville, 1825. *Encycl. meth.* Ins. 10: 35 [♀; East Indies; misidentification of *Sphex violacea* Fabricius, 1775].

Pelopoëus (*Chalybion*) *Bengalensis* Dahlbom, 1845. *Hym. Europ.* 1: 433 [Bengal; type in Lund, Sweden].

Sceliphron (*Chalybion*) *bengalense* (Dahlbom) Kohl, 1918. *Ann. Naturhist. Hofmus. Wien* 32: 54 [♀, ♂; redescription in revision; records from Ethiopian, Oriental and Australian regions].

This species has a wide distribution in the Palaearctic, Ethiopian, Oriental and Australian regions, and has become established just recently in Hawaii (Weber, 1948. *Proc. Hawaii. Ent. Soc.* 13: 205; first captured in Hawaii in 1947). D. G. Hall informs me that he found the species to be relatively common on Tarawa in the Gilbert Islands in 1945, so perhaps the first migrants to Hawaii came from that particular population. Presumably the species was established on Tarawa during the Japanese occupation either from Japan or the Philippines.

Horne, 1870 (*Trans. Zool. Soc. London* 7: 163-4, pl. 21, figs. 2, 2a), notes that this species in India constructs one or more clay cells which are provisioned with small spiders.

GILBERT ISLANDS: 1 ♀, 3 ♂ ♂; Tarawa Island; July 23, 1945 (D. G. Hall) [KVK].

Sceliphron laetum (Smith)

Pelopoëus laetus Smith, 1856. *Cat. Hym. Brit. Mus.* 4: 229, pl. 7, fig. 1 [♀, ♂; Australia, Ceram; type in London].

Sceliphron (*Pelopoëus*) *laetum* (Smith) Kohl, 1918. *Ann. Naturhist. Hofmus. Wien* 32: 95, figs. 24, 49 [♀, ♂; redescription in revision; records from Moluccas, New Guinea, New Britain, Australia and New Zealand].

Sceliphron sp. Townes, 1946. *Rpt. 14, U. S. Comm. Co. Surv. Micronesia*, p. 50 [common in the Palaus].

This species is readily distinguished from all known species of the genus by the combination of the hind coxa being rectangulate at the base on the outer margin and the apical segments of the abdomen being yellow.

The colonies on Guam and the Palaus almost certainly were

established during the war years by military traffic from the Solomons, and perhaps New Guinea. Several years ago G. E. Bohart informed me that specimens of this species accompanied the ship on which he sailed from the Solomons to Guam early in 1945.

This and the following two species build clay cells which they provision with small spiders.

I have seen material from Australia, New Guinea and the Solomons in addition to that listed below from Micronesia:

MARIANA ISLANDS: 1 ♂; Inarajan, Guam; March 6, 1948 (K. L. Maehler).

CAROLINE ISLANDS: 5 ♀ ♀, 12 ♂ ♂; Arakabesan Island, Palaus; July 18, 1946 (H. K. Townes). 6 ♀ ♀, 1 ♂; Koror Island, Palaus; March 15-25, 1948 (K. L. Maehler).

Sceliphron madraspatanum (Fabricius)

Sphex madraspatana Fabricius, 1781. Spec. ins. 1: 445 [Malabar; type in London (?)].

Pelopoëus interruptus Palisot de Beauvois, 1805. Ins. rec. Afr. Amer., Hym., p. 50, pl. 7, fig. 5 [type in London (?)].

Pelopæus bilineatus Smith, 1852. Ann. Mag. Nat. Hist. (2) 9: 47 [♀; Bombay, India; type in London].

Pelopæus separatus Smith, 1852. Ann. Mag. Nat. Hist. (2) 9: 47 [♀; Bombay, India; type in London].

Pelopoëus pictus Smith, 1856. Cat. Hym. Brit. Mus. 4: 231 [♂; India; type in Oxford (?)].

Pelopoëus conspicillatus A. Costa, 1864. Ann. Mus. Zool. Napoli 2: 112 [♀, ♂; Luzon, Philippines; type in Naples].

Sceliphron (*Pelopoëus*) *kohli* Sickmann, 1894. Zool. Jahrb., Abt. f. Syst. 8: 218 [♀, ♂; Tientsin, China; type in Münster (?)].

Sceliphron (*Pelopoëus*) *madraspatanum* (Fabricius) Kohl, 1918. Ann. Naturhist. Hofmus. Wien 32: 109 [♀, ♂; redescription in revision; records from India, Ceylon, Assam, Burma, Malaya, Sumatra, Java, Borneo, Philippines and Formosa].

Sceliphron sp. Townes, 1946. Rpt. 14, U. S. Comm. Co. Surv. Micronesia, p. 50 [common in the Palaus].

This and the following species belong in the group having the hind coxa rounded at base on outer margin as contrasted with the group exemplified by the preceding species in which this coxa is rectangulate at base on outer margin. Although *madraspatanum* is closely related to *caementarium*, the two are easily separated by the characters noted in the key.

I assume this species was introduced recently to the Palaus from the Philippines, for Yasumatsu does not record it from pre-war material from the Palaus.

CAROLINE ISLANDS: 1 ♀, 7 ♂ ♂; Arakabesan Island, Palaus; July 18, 1946 (H. K. Townes). 1 ♀; Gapik, Babelthuap Island, Palaus; July 19, 1946 (R. G. Oakley). 1 ♀; Babelthuap

Island; July 26, 1946 (H. K. Townes). 2 ♂ ♂ ; Koror Island, Palau; March 15-25, 1948 (K. L. Maehler).

Sceliphron caementarium (Drury)

Sphex caementaria Drury, 1770. *Illustr. Nat. Hist.* 1: 105, pl. 44, figs. 6-8; pl. 45, figs. 8, 10 [♀, ♂ ; West Indies].

Sphex flavomaculata DeGeer, 1773. *Mem. hist. Ins.* 3: 588, pl. 30, fig. 4 [♀ ; Pennsylvania; type in Stockholm].

Sphex lunata Fabricius, 1775. *Syst. ent.*, p. 347 [Antigua; type in Kiel (?)].

Sphex flavipes Fabricius, 1781. *Spec. Ins.* 1: 444 [America; type in Kiel (?)].

Sphex flavipunctata Christ, 1791. *Naturges. Ins.*, p. 301, pl. 30, fig. 1 [West Indies; apparently proposed for *caementaria* Drury].

Sphex affinis Fabricius, 1793. *Ent. syst.* 2: 203 [West Indies; type in Kiel (?)].

Pelopoëus architectus Lepeletier, 1845. *Hist. nat. ins. Hym.* 3: 313 [♀ ; New Orleans; type in Turin (?)].

Pelopoëus Servillei Lepeletier, 1845. *Hist. nat. ins. Hym.* 3: 313 [♀ ; type locality unknown; type in Paris].

Pelopoëus Solieri Lepeletier, 1845. *Hist. nat. ins. Hym.* 3: 318 [♀ ; Guadeloupe; type in Paris].

Pelopoëus Canadensis Smith, 1856. *Cat. Hym. Brit. Mus.* 4: 233 [♂ ; Canada; type in London].

Pelopoëus nigriventris A. Costa, 1864. *Ann. Mus. Zool. Napoli* 2: 60 [North America; type in Naples].

Pelopoëus tahitensis Saussure, 1867. *Reise d. Novara, Zool.* 2: 27, pl. 2, fig. 17 [♀, ♂ ; Tahiti; type in Geneva].

Sceliphron (Pelopoëus) caementarium (Drury) Kohl, 1918. *Ann. Naturhist. Hofmus. Wien* 32: 115, figs. 4, 58 [♀, ♂ ; redescription in revision; records from North and Central America, West Indies and Tahiti].

Sceliphron caementarium (Drury) Townes, 1946. *Rpt.* 14, U. S. *Comm. Co. Surv. Micronesia*, p. 50 [common on Tinian and Saipan].

This New World species has been established in Hawaii and Tahiti for a number of years, and it is likely that the colonies in the Marshalls and Marianas were established from specimens from Hawaii during the war.

MARSHALL ISLANDS: 3 ♀ ♀ , 4 ♂ ♂ ; airport on Kwajalein Island; November 4, 1946.

MARIANA ISLANDS: 1 ♂ ; Afetna Point, Saipan; June 27, 1946 (H. K. Townes). 1 ♀ , 4 ♂ ♂ ; Tinian; June 8, 1946 (H. K. Townes). 1 ♀ ; central section of Tinian; December 31, 1947 (K. L. Maehler). 1 ♀ ; Agaña airport, Guam; May 23, 1948 (K. L. Maehler).

***Lestica (Solenius) constricta*, new species**

Crabro (Ceratocolus) quadriceps Bingham, Yasumatsu, 1939. Mushi 12: 153, pl. 6, figs. 1-4 [♂; Babelthup Island, Palau; misidentification].

Crabro quadriceps Bingham, Townes, 1946. Rpt. 14, U. S. Comm. Co. Surv. Micronesia, p. 51 [common in the Palau].

Yasumatsu's description and figures agree in all essential respects with the series of males before me. There is, likewise, no doubt that the present species is distinct from the true *quadriceps* of Bingham: There are too many points of difference, in both sculpture and color, between Bingham's description of the female *quadriceps* and my series of three females of the present species. Furthermore, *quadriceps* has been placed in the synonymy of the widely distributed *alata* (Panzer), questionably by Kohl, 1915 (Ann. k. k. Naturhist. Hofmus. Wien 29: 125), and definitely by Turner, 1912 (Ann. Mag. Nat. Hist. [8] 10: 376), a species which belongs to the typical subgenus rather than to *Solenius*.

Later, Yasumatsu, 1942 (Mushi 14: 90), recorded additional material of both sexes of *quadriceps* from China and Formosa. If these latter specimens are conspecific with Palau material, and I have no reason to doubt Yasumatsu's placing them together, *constricta* has a fairly extended range and probably will be found also in the Philippines. Therefore, the possibility exists that the species is not endemic in the Palau, but was introduced perhaps from Formosa or the Philippines.

The present species appears to be most closely related to *Lestica (Solenius) wollmanni* (Kohl), new combination, from Turkestan (Kohl, 1915. Ann. k. k. Naturhist. Hofmus. Wien 29: 121 [♀; described as *Crabro (Ceratocolus)*]), agreeing with that species in the very strongly constricted abdominal segments. The male described as the opposite sex of *wollmanni* by Kuznetzov-Ugamskij, 1927 (Zool. Anz. 71: 244; [♂; Berkara, 70 km. west of Aulie-Ata in central Asia]), may be incorrectly associated, since it appears to belong to the subgenus *Clypeocrabro*. However, the distinctions between *Clypeocrabro* and *Solenius* seem difficult to maintain.

The female of *constricta* differs in having the postscutellum black (yellow in *wollmanni*) and the abdominal tergites one to five each with a pair of yellow spots, those of one, two and five being very narrowly separated in the middle (*wollmanni* has bands on one, four and five, lateral spots on two and three). Kohl mentions that the punctation of the abdominal tergites in *wollmanni* is sparser than in *clypeata* (Schreber), whereas the punctation in *constricta* is extremely close, much more so than in *clypeata*. Kohl does not mention the hind margins of the first five abdominal tergites in *wollmanni*, so I assume they are not reflexed in that species, whereas they are in *constricta*. The male which Kuznetzov-Ugamskij associates with *wollmanni* is at once

separated from the male of *constricta* by having the median flagellar segments longer than broad (about as long as broad in *constricta*) and in having the head much more narrowed behind the compound eyes, much as in *clypeata*.

Nothing is known of the habits of this species, but other members of the subgenus nest in stems of pithy plants or in old beetle borings and provision their nests with adult Diptera or Lepidoptera.

Type: ♂; northeast corner of Koror Island, Palau; July 22, 1946 (H. K. Townes). [U. S. National Museum. Type No. 59035].

Male—Length 9 mm., forewing 5.9 mm. Black, rather dull from excessively close punctation, except temples, mesopleuron and second abdominal sternite which are shining; mandible near tip, hind tibia beneath, and hind tarsus above, castaneous; flagellum beneath, tegula, fore tarsus except basal segment, mid femur with a stripe on outer surface, mid tibia beneath, mid tarsus entirely, and hind tarsus beneath, ferruginous; scape except a spot at base behind, broad band along fore margin of pronotal disk narrowly interrupted in middle, pronotal lobe, small spot in middle of scutellum, transverse lateral spots on first to fifth tergites separated in middle by at least half the width of each segment, those of the second the largest and wider laterally, those of the fifth the smallest, mid femur with a stripe behind on outer surface, mid tibia on basal two-thirds of outer surface, and a stripe on outer side of hind tibia on nearly the entire length, flavous; mid coxa behind, hind coxa beneath on apical half, fore trochanter, fore femur except at base of outer surface, fore tibia, and fore basitarsus, stramineous. Front, vertex, dorsum of thorax and of abdomen with short, erect dark brown setae; clypeus, an oblique patch on lower temple parallel with hypostomal carina, lower inner eye margin, mesosternum, and a large, lateral rounded patch on second sternite with dense, short, appressed silvery hairs; remainder of temple, mesopleuron and second sternite with sparser, longer silvery subappressed hairs; fore coxa beneath, all trochanters beneath, fore femur beneath and on upper part of hind surface, and fore tibia beneath with dense, erect white hairs, those on fore femur the longest. Wings moderately infumated with brownish.

Head in frontal view obtrapezoidal, the ratio of height (from apex of clypeus to top of eye) to greatest width (near top of eye) to least width (at posterior mandibular condyle) about 14:13:9; mandible bidentate at tip; clypeus with median length 0.4 times its width, the median longitudinal ridge becoming broader and flattened at apex, the apical margin irregularly rounded, but not dentate; antennal scape ecarinate, three times the interocular distance across middle of antennal fossae, equal in length to the first six flagellar segments; the latter slightly broader than long except for the ultimate which is twice as long as broad, unmodified except for a series of carina-like tyloides beneath on the third to tenth; from above the head evenly narrowed behind eyes, the ratio of its greatest width to least width (just before occipital carina) to median length about 13:9:10; ocellular distance equal to postocellar distance, the ocelli in an isosceles triangle, postocellar distance 1.5 times the anterolateral ocellar distance; temple broad, flat, its width across middle 1.5 times the width of eye at middle; scapal area glabrous, impunctate; inner eye margin, upper half of front, and vertex with coarse, contiguous punctures, those of vertex much larger; temple with large scattered punctures except an oblique patch of close, fine ones below; occipital carina foveate above, and again beneath near the hypostomal carina.

Pronotum anteriorly with a transverse, cristate carina, notched in middle and terminating laterally in a large tooth, the width at teeth equal to width of head at occiput; the dorsal surface with punctures contiguous and about as fine as on upper part of front, posteriorly strongly impressed and foveate; mesoscutum with punctures anteriorly as on dorsum of prothorax, toward the rear becoming larger; scutellum punctured like mesoscutum posteriorly; post-

scutellum in middle with dense, finer punctures; mesopleuron with large, deep punctures usually separated by about half the diameter of a puncture; metapleuron longitudinally rugulose; propodeum on lateral surface longitudinally rugulose with a few close punctures posteriorly, dorsal and posterior surface of propodeum rugosoreticulate, the posterior surface more finely so and with smaller reticulations.

Legs modified as follows: Fore leg except coxa flattened beneath, the trochanter lamellate but not toothed, the tarsi patellate, basitarsus with inner margin concave, outer convex, somewhat more than twice as long as width at apex or the following three segments united; mid femur short, its basal width half its length, the hind margin lamellate, mid tibia stout, strongly curved as viewed from side, the tarsi patellate, though not so thin as fore tarsi, the basitarsus concave on fore margin, straight on hind; hind basitarsus slightly flattened beneath, the fore margin convex.

Forewing with marginal cell almost four times as long as wide; first and second abscissae of radius equal in length; second abscissa of cubitus one-fourth the length of first abscissa, the latter subequal in length to transverse cubitus.

Abdomen with first four tergites with reflexed apical margins, the first to fifth just before apex, and the second to fifth at base, deeply constricted; second and third sternites at apex and third at base, constricted; the constricted areas of the first five tergites densely and rather minutely punctate, elsewhere with larger, subcontiguous punctures and glabrous interspaces; exposed parts of sixth and seventh tergites with moderately dense, small punctures, the seventh with a shallow longitudinal depression in middle.

The male paratypes vary in length from 8 to 9.5 mm. and differ from the above in that the median spot on the scutellum is evanescent or lacking in about half the series.

Allotype: ♀; same data as type. [U. S. National Museum.]

Female—Essentially very similar to male except in the details noted below.

Length 9 mm., forewing 6 mm.; all tarsi except basitarsi, ferruginous; scape entirely, pedicel beneath, dorsum of pronotum and scutellum almost entirely, broad lateral spots on first to fifth tergites, those of first, second and fifth very narrowly separated in middle, all basitarsi, all tibiae except hind one beneath, mid femur at apex and a band along hind margin of outer surface, hind coxa beneath, flavous; fore trochanter black; pubescence as in male except golden on clypeus, hair on mesosternum sparse, and legs lacking the modified dense brushes present in male.

Head in frontal view subquadrate, its greatest width one-fifth more than height from apex of clypeus to top of eye; mandible tridentate apically and with a small tooth at middle of inner margin; clypeus with median longitudinal ridge slightly broadened toward tip, the apical margin bidentate in middle and thickened; scape uncarinate, but very feebly so, twice as long as interocular distance across antennal fossae; flagellum without tyloides; head from above subrectangular, the greatest width 1.5 times the length in middle; ocelli in a low triangle, the postocellar distance equal to ocellular distance and twice the anterolateral ocellar distance; punctation of head similar to male except temple densely and more minutely so on upper two-thirds.

Thoracic sculpture similar to male, but pronotal tooth weaker.

Legs without the sexual modifications of male.

Sculpture of abdomen similar to male; pygidium strongly narrowed toward apex, excavate on apical two-thirds and fringed by stiff erect setae.

Female paratypes differ in no way except that one is 9.7 mm. long.

Paratypes: 1 ♀, 1 ♂; same data as type. 3 ♂ ♂; same data as type, but July 20, 1946. 2 ♀ ♀, 5 ♂ ♂; Koror Island, Palau; March 15-25, 1948 (K. L. Maehler). 1 ♀, 1 ♂; Peleliu Island,

Palau; July 23, 1946 (H. K. Townes). One female and two male paratypes will be deposited in the B. P. Bishop Museum, Honolulu.

***Dasyproctus immaculatus*, new species**

Rhopalum (?) sp. Townes, 1946. Rpt. 14, U. S. Comm. Co. Surv. Micronesia, p. 51 [common in the Palau].

The combination of the rather short petiole of first abdominal segment, transverse carina margining the facial concavity above, and the total absence of yellow maculations on body and appendages serves to separate *immaculatus* from the other known species of this genus. It is not at all closely related to *Dasyproctus philippinensis* Ashmead, its closest geographical relative, which has coarse punctures on upper part of front and vertex, a longer, more slender first abdominal segment, and extensive yellow maculations on body and appendages.

Nothing is known of the ethology of this species, but other members of the genus nest in flower stalks or old beetle borings, and provision them with adult Diptera.

Type: ♂; northeast corner of Koror Island, Palau; July 20, 1946 (H. K. Townes). [U. S. National Museum, Type No. 59036].

Male—Length 6.7 mm., forewing 5.0 mm. Black, dull, mat, with greenish reflections, except postscutellum, metapleuron and propodeum shining. Vestiture silvery, dense, short and decumbent on clypeus and facial concavity, sparser, longer and erect on rest of body. Wings slightly infumated, nervures fuscous.

Head in frontal view with greatest width 1.74 times the distance from apex of clypeus to carina margining facial concavity above; clypeus with median ridge well-developed, extending almost to apical margin, the median produced part of clypeus narrow, slightly emarginate at apex; carina margining facial concavity crenulate posteriorly; head viewed from above subrectangular, the greatest width 1.5 times the distance from occiput to carina margining the facial concavity; ocelli in a low triangle, the postocellar distance slightly less than ocellular distance; front with a delicate carina running from anterior ocellus to carina margining facial concavity, with scattered, minute punctures which are about twice as dense as those on vertex; temple near lower eye margin with a few short oblique carinae and also a strong ridge curving upward from posterior mandibular condyle and extending about one-third the height of temple; occipital carina well developed, foveate anteriorly on side and beneath head; pedicel and flagellum of antenna about twice the length of scape, flagellar segments two to eleven with tyloides beneath which are linear on the first two and ultimate one, broadened on the others.

Pronotum with anterior transverse carina weak, present only on lateral fourth, the pronotum deeply notched in middle; mesoscutum, mesopleuron and scutellum with scattered minute punctures, the latter coarsely foveate posteriorly; postscutellum with coarse, longitudinal carinae; metapleuron with a few strong, oblique carinae; propodeum with a narrow, median longitudinal furrow on dorsal and posterior surfaces, the dorsal surface with radiating ridges, the posterior surface with transverse ridges, the lateral surface margining above and behind by a strong carina and with numerous fine, oblique carinae on disk.

Legs without sexual modifications.

Forewing with marginal cell slightly over 3 times as long as wide; second abscissa of radius slightly longer than first; second abscissa of cubitus half the length of the first, the latter subequal to transverse cubitus.

Abdomen with first segment petiolate anteriorly, short, about 1.25 times the length of hind tibia, the petiole subequal in length to the gradually widened, moderately nodose posterior part, the width at apex about half the length of the segment, the petiole shining and rugulosopunctate, the nodose posterior section sparsely and minutely punctate as are tergites two to six; last tergite rather coarsely punctate, a vestigial pygidial area indicated by a short lateral carina on apical fourth; sternites unmodified, practically impunctate, the last sternite truncate apically.

The male paratypes vary in no essential detail from the above description.

Allotype: ♀; Koror Island, Palau; March 15-25, 1948 (K. L. Maehler). [U. S. National Museum].

Female—Length 8.7 mm., forewing 5.9 mm. Essential details as in male, with the following exceptions: Metapleuron and propodeum dull, but not mat; sternum of abdomen shining. Punctuation as fine as in male, but everywhere correspondingly somewhat denser.

Head viewed from above with greatest width 1.73 times the median length from occiput to carina margining facial concavity; lower third of temple with six to eight oblique carinae running between eye margin and ridge from posterior mandibular condyle.

Thorax with posterior part of scutellum with short longitudinal carinae, not foveate; posterior surface of propodeum with carinae longitudinal, instead of transverse.

Abdomen with pygidium excavate, punctate at base, strongly narrowed toward apex, fringed laterally by stiff erect setae.

The female paratype is 9.0 mm. long and agrees in all details of sculpture with the allotype.

Paratypes: 2 ♂ ♂; northeast corner of Koror Island, Palau; July 22, 1946 (H. K. Townes). 1 ♀; same data as allotype (KLM). One male paratype will be deposited in the B. P. Bishop Museum, Honolulu.

Tachysphex bengalensis Cameron

Tachysphex bengalensis Cameron, 1889. Mem. Proc. Manch. Lit. Phil. Soc. (4) 2: 144 [♀; Tirhoot, India; type in London].

Tachysphex sp. Townes, 1946. Rpt. 14, U. S. Comm. Co. Surv. Micronesia, p. 50 [Palau].

The present species is widely distributed in the Oriental region and recently has become established in Hawaii (Weber, 1948. Proc. Hawaii. Ent. Soc. 13: 203—erroneously reported as *bituberculatus* Cameron). The populations in the Palau, Marianas and Hawaii probably originated from specimens introduced from the Philippines.

The habits of this species are unknown, but other members of the genus construct shallow burrows, usually in sandy soil, which they provision with Orthoptera.

MARIANA ISLANDS: 1 ♀, 2 ♂ ♂; Susupe, Saipan; January 1, 1948 (K. L. Maehler).

CAROLINE ISLANDS: 1 ♀; Peleliu Island, Palau; July 23, 1946 (H. K. Townes).

Dicranorhina species

F. X. Williams informs me that he observed several specimens belonging to this genus running in a characteristic high-legged fashion near his quarters while in the Palau in June 1948. He describes the manner of running (1928. *Bul. 19, Ent. Ser., Expt. Sta. Hawaii. Sugar Pl. Assoc.*, p. 100) in *luzonensis* Rohwer as "a peculiar easy gait, the fore part of the body being raised considerably higher than the posterior." It is unlikely that an endemic species would have escaped capture by the several expeditions which visited the Palau from 1936 to 1946 because of the semi-domiciliary habits of the known species, so it seems probable that the species seen by Williams is a recent introduction to the Palau, perhaps *luzonensis* Rohwer.

Motes subtesselatus (Smith)

Larrada subtesselata Smith, 1856. *Cat. Hym. Brit. Mus.* 4: 277 [♀ ; India, Sumatra, Java ; type in London].

Notogonia manilensis Rohwer, 1910. *Proc. U. S. Natl. Mus.* 37: 659 [♂ ; Manila, Luzon, Philippines ; type in Washington]. New synonymy.

Notogonidea luzonensis Rohwer, 1919. *Bul. 14, Ent. Ser., Expt. Sta. Hawaii. Sugar Pl. Assoc.* p. 9 [♀ ; Los Baños, Luzon, Philippines ; type in Washington].

Motes subtesselatus (Smith) Townes, 1946. *Rpt. 14, U. S. Comm. Co. Surv. Micronesia*, p. 50 [Kwajalein].

Williams, 1928 (*Bul. 19, Ent. Ser., Expt. Sta. Hawaii. Sugar Pl. Assoc.*, p. 73), synonymizes *manilensis* (Rohwer) with *laboriosus* (Smith). An examination of the type shows that this is incorrect. Rohwer's type is a male of *subtesselatus* (Smith) and agrees with the characters cited in the foregoing key as well as those ascribed to *subtesselatus* by Williams (*loc. cit.*, pp. 70, 73). Williams (*loc. cit.*) is the authority for the other synonymy given above.

This common and widely distributed Oriental species was introduced into Hawaii from the Philippines over 25 years ago. Presumably the Marshall Islands population arose from specimens accidentally introduced there from Hawaii.

This species constructs tunnels in the soil and provisions the cells with crickets (Gryllidae).

MARSHALL ISLANDS: 1 ♀ ; no other locality; 1932 (on coconut flowers). 1 ♂ ; Kwajalein Island, Kwajalein Atoll; August 17, 1946 (H. K. Townes). 1 ♂ ; Kwajalein Island, November 2, 1946 (on leaves of *Wedelia biflora*).

Motes laboriosus (Smith), new combination

Larrada laboriosa Smith, 1856. *Cat. Hym. Brit. Mus.* 4: 278 [♀ ; Philippines ; type in London].

Notogonia crawfordi Rohwer, 1910. Proc. U. S. Natl. Mus. 37: 659 [♀ ; Manila, Luzon, Philippines; type in Washington].

This is another common and widely distributed Oriental species probably established in the Marianas by way of the Philippines. Williams, 1928 (Bul. 19, Ent. Ser., Expt. Sta. Hawaii. Sugar. Pl. Assoc., p. 73) is the authority for the above synonymy. The records from Micronesia are as follows:

MARIANA ISLANDS: 1 ♀ ; Hagoya Lake, Tinian; June 10, 1946 (H. K. Townes). 3 ♀ ♀ ; Tinian; June 13, 1946 (H. K. Townes). 1 ♀ ; Susupe, Saipan; January 1, 1948 (K. L. Maehler). 1 ♀ ; Agricultural Farm, Guam; February 28, 1948 (K. L. Maehler). 1 ♂ ; Piti, Guam; March 13, 1948 (K. L. Maehler; on *Ipomoea*).

Motes manilae (Ashmead)

Notogonia manilae Ashmead, 1905. Proc. U. S. Natl. Mus. 28: 130 [♀ , ♂ ; Manila, Luzon, Philippines; type in Washington].

Notogonia retiaria Turner, 1908 Proc. Zool. Soc. London, p. 479 [♀ ; Perth, Australia; type in London].

Notogonidea williamsi Rohwer, 1919. Bul. 14, Ent. Ser., Hawaii. Sugar Pl. Assoc., p. 9 [♀ ; Los Baños, Luzon, Philippines; type in Washington].

Motes manilae (Ashmead) Yasumatsu, 1941. Mushi 14: 44 [♀ from Pagan Island, Marianas; ♂ from Babelthuap Island, Palau].—Townes, 1946. Rept. 14, U. S. Comm. Co. Surv. Micronesia, p. 50 [Guam].

Notogonidea manilae (Ashmead) Swezey, 1942. B. P. Bishop Mus. Bul. 172: 184 [Guam].

Williams, 1928 (Bul. 19, Ent. Ser., Expt. Sta. Hawaii. Sugar Pl. Assoc., p. 75), and 1945 (Proc. Hawaii. Ent. Soc. 12: 444) is the authority for the above synonymy. *M. manilae* is widely distributed in the Oriental and Australasian regions and is present on many of the Pacific islands. It nests in the soil and provisions the cells with small crickets (*Nemobius*).

MARIANA ISLANDS: 1 ♀ ; U. S. Commercial Co. Farm, Saipan; June 17, 1946 (R. G. Oakley). 1 ♀ ; Mt. Santa Rosa, Guam; February 26, 1948 (K. L. Maehler). 1 ♀ ; same, but March 12, 1948. 1 ♂ ; Dededo, Guam; April 8, 1948 (K. L. Maehler). 1 ♂ ; Agaña, Guam; December 17, 1947 (K. L. Maehler). 1 ♀ ; same, but February 22, 1948 (on *Ipomoea*). 2 ♀ ♀ ; same, but March 10, 1948 (on *Passiflora foetida*). 1 ♀ ; Agaña airport, Guam; June 13, 1946 (H. K. Townes). 1 ♀ ; same, but May 26, 1948 (K. L. Maehler). 1 ♂ ; same, but May 23, 1948 (on *Ipomoea*). 1 ♀ ; Mt. Alutom, Guam; June 6, 1946 (H. K. Townes). 1 ♂ ; Yona, Guam; November 18, 1937 (R. G. Oakley). 1 ♂ ; Ylig, Guam; December 14, 1947 (K. L. Maehler; on *Scaevola*).

1 ♀; Talofoto, Guam; December 19, 1947 (K. L. Maehler). 1 ♀; Haputo Point, Guam; April 27, 1948 (K. L. Maehler). 1 ♀; Guam; 1937 (R. G. Oakley). 1 ♂; Tumon Bay, Guam; April 27, 1948 (K. L. Maehler).

CAROLINE ISLANDS: 1 ♂; Fefan Island, Truk Atoll; May 27, 1946 (H. K. Townes). 2 ♀ ♀; Koror Island, Palaus; March 15-25, 1948 (K. L. Maehler) [KLM].

Motes townesi,⁶ new species

Motes sp. Townes, 1946. Rpt. 14, U. S. Comm. Co. Surv. Micronesia, p. 50 [Palau].

The present species belongs to the difficult complex containing *manilae* (Ashmead), *tristis* (Smith), *samoensis* (Williams), *bakeri* (Williams), *ligulata* (Williams) and others. It is at once separable from all of them by the extremely sparse thoracic punctation. Apparently it is closest to *samoensis*, which differs in the male in genitalic features and shorter basal flagellar segments, in the female in the lack of silvery bands on abdomen, and in both sexes in the denser punctation of the thorax. Like *samoensis*, *townesi* is larger (♀, 9.2 mm.; ♂, 8.5 mm.) than the ubiquitous *manilae* (♀, 6.5-8.3 mm.; ♂, 5.0-6.5 mm.).

Type: ♀; Arakabesan Island, Palaus; July 18, 1946 (H. K. Townes). [U. S. National Museum, Type No. 59037.]

Female—Length 9.2 mm., forewing 6.7 mm. Black, shining; middle of mandible castaneous. Vestiture sparse, inconspicuous, short, fine silvery, mostly appressed on head, legs and abdomen, suberect on thorax; first three abdominal tergites with silvery bands on apical fourth; pygidium with short, dense, appressed silvery pubescence and scattered, long, fine suberect bristles. Wings slightly infumated and with iridescent reflections, veins fuscous.

Head: Produced part of clypeus with a shallow emargination in middle and no lateral notch, the bevel extending across apical third and with scattered punctures; front and vertex with delicate punctures, those on front separated by at least the width of a puncture, those on vertex denser, the callosities along inner eye margin impunctate, delicately shagreened; the least interocular distance on vertex 1.3 times the length of the first flagellar segment, the first two flagellar segments subequal in length.

Thorax: Mesoscutum with moderately large punctures many of which are separated by the width of a puncture (all subcontiguous in *manilae*); scutellum with finer punctures separated by several times the width of a puncture; postscutellum equally finely punctate, but more closely so; mesopleuron with extremely scattered, fine punctures; dorsum of propodeum regularly rugulosopunctate, formed chiefly from suboblique rugulae, the median longitudinal carina present only on basal half; posterior surface with fine transverse carinae, the central sulcus with raised margins which diverge strongly above in an arched line near dorsum.

Abdomen: Pygidium with sides slightly convex, the basal width about six-sevenths the length.

Wings: Marginal cell obliquely truncate, the relative lengths of the abscissae about 7:3:3:8:3.

Allotype: ♂; same data as type. [U. S. National Museum.]

⁶ For H. K. Townes, Division of Insect Identification, Bureau of Entomology and Plant Quarantine, in recognition of his diligent and thorough collecting in Micronesia.

Male—Length 8.5 mm., forewing 6.4 mm. Similar to female in color and vestiture, the punctuation correspondingly somewhat denser.

Head: Apical margin of produced part of clypeus evenly rounded, not notched; scape plus first flagellar segment subequal to least interocular distance on vertex, the first flagellar segment slightly less than twice as long as width at apex.

Wings: Relative lengths of abscissae of marginal cell about 7:2:3:8:3.

Genitalia: Paramere similar in shape to *samoensis*, the apical half relatively narrower; in *manilae* the paramere is abruptly narrowed halfway to tip, but is rather evenly narrowed in *townesi* and *samoensis*; in *townesi* the bristles along outer margin of paramere at middle are denser than in *manilae*.

Liris opulenta (Lepeletier)

Sphex aurata Fabricius, 1787. Mant. Ins. 1: 276 [East Indies; type in Kiel (?); preoccupied by Linnaeus, 1758].

Tachytes opulenta Lepeletier, 1845. Hist. Nat. Ins. Hym. 3: 246 [♀, ♂; Java; type in Paris].

Liris aurata (Fabricius) Yasumatsu, 1937. Mushi 9: 129 [Saipan Island, Marianas]. — Yasumatsu, 1940. Akitu 2: 184 [Pagan Island, Marianas].—Yasumatsu, 1941. Mushi 14: 45 [♀, ♂; Marianas].—Swezey, 1942. B. P. Bishop Mus. Bul. 172: 184 [records from Guam].—Townes, 1946. Rpt. 14, U. S. Comm. Co. Surv. Micronesia, p. 50 [Kwajalein, Marianas, Truk, Palaus].

This handsome wasp is widely distributed in the Ethiopian and Oriental regions and has become established on many of the Pacific islands including Hawaii (Weber, 1947. Proc. Hawaii. Ent. Soc. 13: 22). Richards, 1935 (Trans. Roy. Ent. Soc. London 83: 164), has pointed out that the Fabrician *Sphex aurata* was preoccupied by Linnaeus, and that the Fabrician species probably should be known as *opulenta* (Lepeletier). It has been recorded as nesting in the soil and storing large crickets (Gryllidae).

MARSHALL ISLANDS: 1 ♀; Kwajalein Island, Kwajalein Atoll; August 16, 1946 (H. K. Townes). 3 ♂ ♂; same data, but August 17, 1946. 2 ♂ ♂; same data, August 17, 1946 (R. G. Oakley).

MARIANA ISLANDS: 4 ♀ ♀; Guam; 1937 (R. G. Oakley). 1 ♀; Com Mar Hill, Guam; January 10, 1948 (K. L. Maehler). 1 ♀; Tinian; June 9, 1946 (H. K. Townes). 1 ♂; same data, but June 13, 1946 (H. K. Townes).

CAROLINE ISLANDS: 1 ♂; Moen Island, Truk Atoll; May 31, 1946 (H. K. Townes; possibly preys on *Conocephalus* or *Anaxirpha* [Orthoptera]). 1 ♀; same data, but June 30, 1946 (K. J. Pelzer). Townes states that it was common also on Dublon Island, Truk Atoll, but no specimens were taken. 2 ♂ ♂; Peleliu Island, Palaus; July 23, 1946 (H. K. Townes).

Liris esakii Yasumatsu

Liris esakii Yasumatsu, 1941. Mushi 14: 46, pl. 1, figs. 1-3 [♀, ♂; Yap, Truk; type in Fukuoka, Japan].

This species is readily distinguished from the other Micronesian *Liris* by the combination of the strongly infumated wings, the sparser punctation of the mesoscutum, the radiating carinae on the dorsum of the propodeum, the dark brown pile on the female pygidium, and the almost total lack of carinae on the lateral surface of the propodeum of the male. Yasumatsu shows the male clypeus as having the margin of the produced part shallowly concave and without a central notch. My two males have a central notch, and the margin is subtruncate in one, and convex on each side of the central notch in the other, so there is considerable variation in this character.

CAROLINE ISLANDS: 2 ♀ ♀, 1 ♂; Moen Island, Truk Atoll; February 6, 1948 (K. L. Maehler). 1 ♂; same data, but February 7, 1948 (K. L. Maehler; in field). 1 ♂; Dublon Island, Truk Atoll; February 10, 1948 (K. L. Maehler; in field). 1 ♀; same date, but February 11, 1948. 1 ♀; Nif-Guilifez, Yap Island; September 7, 1939 (T. Esaki)—paratype.

Liris samoensis Williams

Liris samoensis Williams, 1928. Ins. Samoa, Hym., Pt. 5, Fasc. 1, p. 36, text figs. 10-12 [♀, ♂; Samoa; type in London].—Yasumatsu, 1941. Mushi 14: 45, pl. 1, fig. 4 [Ponape].

Yasumatsu records a single male from Ponape as this species. He states that the occipital carina is angulate lateroventrally instead of rounded as in other species of the genus. The Ponape specimen was not compared with Samoan material, and there is some possibility that the Ponape form is at least subspecifically distinct. The female of the Samoan form has the pygidial pile pale golden, which readily distinguishes it from the closely related *esakii* and *williamsi* which have dark brown pile on the pygidium. I have seen no material from Ponape, and the species is included in the key on the basis of a pair of paratypes made available by E. C. Zimmerman and R. H. Van Zwaluwenburg.

Liris williamsi,⁷ new species

The present species is most closely related to *esakii* Yasumatsu. In addition to the hyaline wings and weaker oblique carinae on the dorsum of the propodeum, *williamsi* is separated from *esakii* by the relatively denser punctation of the mesoscutum and the better developed shoulder below the lateral angle of the produced part of the clypeus. This species is endemic in the Palaus.

Type: ♀; northeast corner of Koror Island, Palaus; July 22, 1946 (H. K. Townes). [U. S. National Museum, Type No. 59038.]

Female—Length 10.8 mm., forewing 9.2 mm. Black, head and thorax opaque, abdomen rather shining; tip of mandible castaneous. Vestiture rather sparse, very inconspicuous, fine, and silvery, appressed and rather dense on

⁷ For F. X. Williams, formerly of the Hawaiian Sugar Planters' Association, in recognition of his many useful contributions to our knowledge of the wasps of Oceania.

clypeus and lower half of front, sparser and appressed on thorax, legs and abdomen, the thorax in addition with some longer, suberect hairs, first three abdominal tergites with a short, narrow strip of appressed silvery pubescence laterally at apex; pygidium with dense, short, appressed dark brown hairs, and a few suberect bristles. Wings hyaline and with iridescent reflections, the apices slightly infuscated, nervures black.

Head: Clypeus punctate almost to apical margin, the latter with a narrow median notch, and a small shoulder at lateral angle of produced part, the margin between notch and shoulder slightly convex, the apical third of clypeus shining and with larger punctures than the basal two-thirds which is dull from close, fine punctation; first and second flagellar segments subequal in length, the least interocular distance on vertex 1.13 times the length of the first flagellar segment.

Thorax: Mesoscutum with moderately large punctures, anteriorly somewhat closer than on the posterior three-fourths where they are separated by about the width of a puncture; scutellum with smaller punctures separated by about twice the width of a puncture; postscutellum more finely and rather closely punctate; mesopleuron shagreened; dorsal surface of propodeum with a well-defined shallow central sulcus which encloses a carina on basal half, elsewhere with weak, irregular oblique carinae; side of propodeum with a few oblique carinae on anterior half; posterior surface of propodeum with a narrow, impressed median line, above with a couple irregular transverse carinae, elsewhere scabrous.

Abdomen: Pygidium with sides slightly convex, the basal width about three-fifths the length.

Wings: Relative lengths of abscissae of marginal cell of forewing about 9:3:5:11:2.

Paratype: ♀; Koror, Palau Islands; March 15-25, 1948 (K. L. Maehler; in field). It is 10.5 mm. long and differs from the type in lacking a central carina on basal half of dorsum of propodeum. The paratype will be deposited in the B. P. Bishop Museum, Honolulu.

Liris (?) mindanaoensis carolinensis Yasumatsu

Liris mindanaoensis carolinensis Yasumatsu, 1941. Mushi 14: 46, pl. 1, fig. 5 [♂; Tol Island, Truk Atoll; type in Fukuoka, Japan].

I have had to omit this form from the key because of lack of material and a suspicion that it may be placed in the incorrect genus. The measurements given by Yasumatsu (length: head 2.5 mm.; forewing 2.0 mm.; hind wing 1.5 mm. Width: head 1.5 mm.; thorax 2.0 mm.; abdomen 1.5 mm.) indicate a larrine wasp much smaller than any I have seen from Micronesia. Even the tiniest male *Motes manilae* (body length 5.0 mm.) known to me has a forewing 4.0 mm. in length. The known species of *Liris* are all much larger, no Micronesian males being less than 7.0 mm. long (forewing 6.0 mm.). Certainly if *carolinensis* is a true *Liris* it is specifically distinct from *mindanaoensis* which is almost as large as *opulenta*.

Solierella rohweri (Bridwell)

Silaon rohweri Bridwell, 1920. Proc. Hawaii. Ent. Soc. 4: 398, fig. [♀, ♂; Oahu; type in Honolulu].

This species, which nests in abandoned beetle borings in *Euphorbia* in Hawaii and provisions the nests with nymphs of *Nysius* (Lygaeidae), is apparently a recent migrant to the Marshalls. In the discussion accompanying the original description Bridwell suggests that the species may have been introduced into Hawaii, possibly from Central America. Krauss, 1945 (Proc. Hawaii. Ent. Soc. 12: 317), made the above generic transfer.

MARSHALL ISLANDS: 1 ♂; Engebi Island, Eniwetok Atoll; May 18, 1946 (H. K. Townes and R. G. Oakley).

***Trypoxylon philippinense* Ashmead**

Trypoxylon philippinense Ashmead, 1904. Canad. Ent. 36: 283 [♂; Manila, Luzon, Philippines; type in Washington].

This Philippine species was established in Hawaii as early as 1914 (Swezey, 1915. Proc. Hawaii. Ent. Soc. 3: 86). Swezey reports that it builds clay cells in sheltered situations and provisions them with spiders. The specimen listed below was collected on Guam, but apparently may not have become established for it has not been taken in recent years.

MARIANA ISLANDS: 1 ♀; Root Farm, Guam; August 25, 1938 (R. G. Oakley; flying in office).

***Pison punctifrons* Shuckard**

Pison punctifrons Shuckard, 1837. Trans. Ent. Soc. London 2: 77 [♀; India or St. Helena; type in Oxford].—Yasumatsu 1937. Mushi 9: 134 [♀; Palaus].—Yasumatsu, 1939. Festschr. 60 Geburtst. E. Strand 5: 83.

Pison suspiciosus Smith, 1858. Jour. Proc. Linn. Soc. Zool. 2: 104 [♀; Singapore; type in Oxford].

Pison fabricator Smith, 1869. Trans. Ent. Soc. London, p. 297 [♀; Hong Kong; type in London].

Pison striolatum Cameron, 1896. Mem. Manch. Lit. Phil. Soc. 41: 82 [♀; Missouri; type in Oxford].

Pison lagunae Ashmead, 1904. Proc. U. S. Natl. Mus. 28: 131 [♂; Laguna de Bay, Luzon, Philippines; type in Washington].—Swezey, 1942. B. P. Bishop Mus. Bul. 172: 185 [records from Guam]. New synonymy.

Pison javanus Cameron, 1905. Tijds. f. Ent. 48: 63 [♂; Java; type in Amsterdam].

Pison sp. Fullaway, 1913. Hawaii. Ent. Soc., Proc. 2: 283 [Guam].

The above synonymy is based on Turner, 1916 (Proc. Zool. Soc. London, p. 625, sp. 81), except that *lagunae* Ashmead, of which I have seen the type, is also placed in synonymy. Turner had treated the latter as a possible synonym (*loc. cit.*, sp. 83). This is one of the most widely distributed and easily recognized *Pison* occurring in Micronesia. It is not an endemic species.

The species constructs either free clay cells or partitions holes in timber and provisions the cells with small spiders.

MARSHALL ISLANDS: 1 ♂; Japtan Island, Eniwetok Atoll; May 15, 1946 (H. K. Townes).

MARIANA ISLANDS: 1 ♀; Agrihan Island; August 6, 1945 (D. J. Borror). 1 ♀; same data, but August 7, 1945. 2 ♀ ♀; Saipan; June 28, 1946 (H. K. Townes). 1 ♀; same data, but December 20, 1944 (Smith). 1 ♂; Tinian; June 9, 1946 (H. K. Townes). 1 ♂; same data, but June 11, 1946 (R. G. Oakley). 1 ♀, 1 ♂; Hagoya Lake, Tinian; June 10, 1946 (H. K. Townes). 1 ♀, 3 ♂ ♂; Guam (D. T. Fullaway). 2 ♂ ♂; Agaña, Guam; December 15, 1947 (K. L. Maehler; on *Thespesia populnea*). 1 ♀, 1 ♂; same data, but December 17, 1947. 1 ♂; Point Oca, Guam; July 1945 (J. L. Gressitt and G. E. Bohart).

CAROLINE ISLANDS: 1 ♂; Machiro Island, Kapingamarangi Atoll; August 4, 1946 (H. K. Townes). 1 ♀; near Yaptown, Yap Island; July 14, 1946 (H. K. Townes). 1 ♂; Koror Island, Palaus; March 15-25, 1948 (K. L. Maehler). 1 ♀, 2 ♂; Melekeiok, Babelthuap Island, Palaus; April 7, 1936 (Z. Ono) [BPB]. 1 ♂; Ogiwal, Babelthuap Island, Palaus; April 10, 1936 (Z. Ono) [BPB].

Pison esakii Yasumatsu

Pison sp. Fullaway, 1913. Proc. Hawaii. Ent. Soc. 2: 283 [Guam].—Swezey, 1942. B. P. Bishop Mus. Bul. 172: 185 [Guam].

Pison esakii Yasumatsu, 1937. Mushi 9: 129, fig. [♀; Rota; type in Fukuoka].

Pison Esakii Yasumatsu, 1939. Festschr. 60 Geburtst. E. Strand 5: 83.

The strongly infumated wings and erect black hairs on head and thorax readily separate this handsome wasp, endemic in the Marianas, from all others in Micronesia. Peculiarly enough the male is still unknown, though it should be easily recognized, since it probably has the same characters of coloration and pubescence. The species is rare in collections and I suspect must be a sylvicolous species.

MARIANA ISLANDS: 1 ♀; Guam (D. T. Fullaway). 1 ♀; Point Ritidian, Guam; April 16, 1936 (E. H. Bryan, Jr.). 1 ♀; same data, but June 1945 (J. L. Gressitt). 1 ♀; Piti, Guam; June 12, 1936 (O. H. Swezey; at light). 2 ♀ ♀; Mt. Alifan, Guam; June 27, 1936 (O. H. Swezey). 1 ♀; Tinian; June 9, 1946 (H. K. Townes). Occurs also on Rota (type locality).

Pison nigellum, new species

The present species, endemic on Ponape, is the only Micronesian *Pison* except the Guam *esakii* with erect black pubescence on the

head and thorax. It differs from *esakii*, *inter alia*, in the smaller size, the more or less pentagonal clypeal lobe, details of the propodeal sculpture and hyaline wings.

Type: ♀; near hydroelectric plant, Colonia, Ponape; August 9, 1946 (H. K. Townes; along roads, stream banks and bottomland native vegetation). [U. S. National Museum, Type No. 59039.]

Female—Length 8.0 mm., forewing 6.2 mm. Black, head opaque, thorax and abdomen shining; mandible castaneous near tip. Erect vestiture short, black, moderately dense on head and thorax, very sparse on abdomen; clypeus and lower half of front with appressed, short, dense silvery pubescence, abdomen with much sparser, shorter appressed silvery hairs and without apical hair-bands; tibial calcaria black. Wings hyaline and with iridescent reflections, stigma and veins black.

Head: Clypeal lobe impunctate, more or less pentagonal in outline, about one-third the greatest width of clypeus; front finely granulate and with superimposed small, shallow punctures mostly separated by somewhat more than the diameter of a puncture; an evanescent longitudinal groove running from anterior ocellus half the distance toward antennal insertions and terminating in a short polished streak; vertex about as finely punctate as front, but the punctures separated by about the diameter of a puncture; shortest distance between eyes at lower ends (across middle of clypeus) 2.2 times the shortest interocular distance on vertex; ocellular distance one-sixth the diameter of a posterior ocellus and one-fourth the postocellar distance; ratio of lengths of first three segments of flagellum about 13:12:12; least interocular distance on vertex equal to length of first flagellar segment.

Thorax: Mesoscutum with punctures equal in size to those on front, anteriorly separated by about the diameter of a puncture, posteriorly by more than the diameter of a puncture; scutellum and postscutellum with finer, more separated punctures; mesopleuron with punctures equal in size to those on mesoscutum, usually separated by somewhat more than the diameter of a puncture; metapleuron with minute punctures, those on upper third closer together; dorsum of propodeum with sparse, minute punctures, a few very short radiating carinae at base, the median longitudinal carina weak, extending over anterior half only, contained in a very shallow sulcus which is deeper posteriorly; lateral surface of propodeum with minute punctures which are closer than on dorsum, no carina separating lateral from dorsal and posterior surfaces; the latter with the usual deep impression in middle, some scattered fine punctures and above insertion of muscle a few short, transverse carinae interrupted at midline.

Abdomen: Tergites with minute scattered punctures, the first five very slightly constricted at apex; second sternite practically impunctate.

Wings: Forewing with petiole of second submarginal cell 1.4 times the height of cell; first recurrent vein interstitial with first transverse cubital vein, the second slightly distad of the second transverse cubital.

Female paratypes vary in length from 7.0 to 8.5 mm., and differ from the above description in no important details, except that occasionally the first recurrent vein in the forewing is received proximad of the first transverse cubital vein.

Allotype: ♂; Ponape; March 14, 1936 (Z. Ono). [B. P. Bishop Museum.]

Male. Length 7.2 mm., forewing 5.4 mm. Similar to the type in color, vestiture and sculptural characters with the following exceptions.

Head: Clypeal lobe pentagonal in shape, but the apex more narrowly rounded; shortest distance between eyes at lower ends (across middle of

clypeus) 1.7 times the shortest interocular distance on vertex; ocellular distance about one-third the diameter of a posterior ocellus and one-half the postocellar distance; least interocular distance on vertex about 1.5 times the length of the first flagellar segment.

Thorax: Punctuation correspondingly somewhat sparser than in female.

Abdomen: Third sternite without a median tubercle or ridge; second to fifth sternites with low, rounded, transverse, posterolateral ridges, those of third the longest and strongest, those of fifth very short; hypopygium with surface flat, clothed with stout bristles on exposed part, the apical margin truncate.

Wings: First recurrent vein slightly proximad of first transverse cubital vein, second recurrent slightly distad of second transverse cubital.

Paratypes: 1 ♀; same data as type [USNM]. 1 ♀; Kolonie, Ponape; February 2, 1936 (Z. Ono). 5 ♀ ♀; Ronkiti, Ponape; February 4, 1936 (Z. Ono). 1 ♀; Wone, Ponape; February 11, 1936 (Z. Ono). 3 ♀ ♀; Roi, Ponape; February 14, 1936 (Z. Ono). 1 ♀; Reitao, Ponape; March 1, 1936 (Z. Ono). 2 ♀ ♀; Tamon-Reitao, Ponape; March 1, 1936 (Z. Ono). 7 ♀ ♀; Ponape; March 14, 1936 (Z. Ono) [BPB].

***Pison argentatum* Shuckard**

Pison (Pisonitus) argentatus Shuckard, 1837. Trans. Ent. Soc. London 2: 79 [♀; Mauritius; type in Oxford].

Pison fuscipalpis Cameron, 1901. Proc. Zool. Soc. London 2: 27 [♀; Singapore; type in London].

Pisonitus argenteus Ashmead, 1904. Proc. U. S. Natl. Mus. 28: 131 [♀; Bacoor, Philippines; type in Washington].

Pison argentatum Shuckard, Swezey, 1942. B. P. Bishop Mus. Bul. 172: 185; [Guam; parasitized by *Melittobia*; stores small spiders].

The present species and *ignavum* Turner are easily distinguished from other *Pison* occurring in Micronesia by the pale tibial calcaria, extremely dense silvery pubescence and the second recurrent vein being received in the middle of the second submarginal cell. *P. argentatum* is smaller (aver. length, ♀ -6 mm., ♂ -5 mm.) than *ignavum* (aver. length, ♀ -8 mm., ♂ -7 mm.), the punctuation is finer though equally dense, the apical margin of the clypeal lobe is not depressed in the middle in the female, and the oblique carinae on the dorsum of the propodeum are weaker and tend to become evanescent toward the margins. The present species is more widely distributed than any other *Pison*, occurring in the Ethiopian and Oriental regions, and on various Pacific islands east to Hawaii. It constructs free clay cells in sheltered situations which it provisions with small spiders.

MARIANA ISLANDS: 2 ♀ ♀, 3 ♂ ♂; Pago, Guam; May 9, 1945 (J. L. Gressitt and G. E. Bohart). 1 ♂; Talofofo, Guam; February 26, 1948 (K. L. Maehler).

CAROLINE ISLANDS: 1 ♀; Dublon Island, Truk Atoll;

February 10, 1948 (K. L. Maehler; reared from clay cells in church; parasitized by *Melittobia hawaiiensis* Perkins [Chalcididae]). 1 ♀; Ronkiti, Ponape; February 4, 1936 (Z. Ono) [BPB].

***Pison ignavum* Turner**

Pison ignavum Turner, 1908. Proc. Zool. Soc. London, p. 511 [♀, ♂; Australia; type in London].

Pison argentatum ignavum Turner, 1916. Proc. Zool. Soc. London, p. 601 [recorded from Australia and Fiji].

The present species has been recorded from Australia, New Caledonia, Fiji, Society Islands, Samoa and the Marquesas. I agree with Williams, 1932 (B. P. Bishop Mus. Bul. 98: 152-153) in treating it as a species distinct from, though uncomfortably close to, *argentatum* Shuckard. Like the latter, it builds free clay cells in sheltered situations which it provisions with small spiders.

CAROLINE ISLANDS: 1 ♂; Koror Island, Palaus; March 15-25, 1948 (K. L. Maehler).

***Pison hospes* Smith**

Pison hospes Smith, 1879. Jour. Linn. Soc. Zool. 14: 676 [♀, ♂; Hawaii; type in London].

Pison fuscipennis Smith, Yasumatsu, 1937. Mushi 9: 131, pl. 10, figs. 3, 4 [♀, ♂; Palaus; misidentification of Smith species].—Yasumatsu, 1939. Festschr. 60 Geburtst. E. Strand 5: 83.

Pison palauensis Yasumatsu, 1937. Mushi 9: 133 [*nomen nudum* occurring in description of *Pison korrorensis*].

The comparatively large size, triangular clypeal lobe, and dense punctation of mesopleuron and second abdominal sternite distinguish the present species from others occurring in Micronesia. The Marshall Islands populations may have arisen from migrants from Hawaii. The species was present in the Palaus as early as 1936.

Yasumatsu's description and figures of what he calls *fuscipennis* Smith agree with specimens of the present species. The species does run to *fuscipennis* in Turner's table to the Australian species (1916, Proc. Zool. Soc. London, pp. 595-599), but *hospes* is not included in that key. Since Turner apparently knew both species and treated them as distinct I shall follow him. Turner does mention (*loc. cit.*) that *hospes* "is doubtfully distinct from *P. pallidipalpis* Smith." The latter name has precedence if the two are conspecific.

MARSHALL ISLANDS: 1 ♀, 1 ♂; Airek Island, Ailinglaplap Atoll; August 26, 1946 (H. K. Townes). 1 ♀; Imrodi Island, Jaluit Atoll; August 24, 1946 (H. K. Townes).

CAROLINE ISLANDS: 1 ♀, 1 ♂; Peleliu Island, Palaus (Z. Ono) [BPB]. 1 ♀; Peleliu Island, Palaus; July 23, 1946 (H. K.

Townes). 3 ♀ ♀ ; Koror Island, Palaus; March 15-25, 1948 (K. L. Maehler). 1 ♀ ; Palau Islands; April 8, 1936 (Z. Ono) [BPB]. 1 ♀ ; Airai, Palaus; April 17, 1936 (Z. Ono) [BPB].

***Pison tahitense* Saussure**

Pison tahitense Saussure, 1867. Reise d. Novara, Zool. 2, Hym., p. 65 [♀ , ♂ ; Tahiti; type in Geneva (?)].

Pison Rechingeri Kohl, 1908. Denkschr. Akad. Wiss. Wien 81: 309 [♀ , ♂ ; Samoa; type in Vienna (?)].

Apparently this is a recent introduction to Micronesia. Previously it was known from the Fijis, Samoa, Society Islands, Ellice Islands and the Marquesas. Its closest relatives in Micronesia are *hospes* and *ponape*, from which it may be distinguished by a combination of the infumated wings, well-developed median carina on dorsum of propodeum, and the sculpture of the posterior surface of the propodeum and second abdominal sternite.

MARSHALL ISLANDS: 1 ♀ ; Bigatyelang Island, Ailing-lapalap Atoll; August 25, 1946 (H. K. Townes).

***Pison ponape*, new species**

The present species, known from the female only, forms with *hospes* and *tahitense* a group rather well segregated from the other Micronesian species. The group is distinguished by the subcontiguous punctation of mesopleuron, lack of oblique carinae on dorsum of propodeum, unmodified third abdominal sternite of males, and the rather large size, females averaging over 9 mm. in length and the known males over 8 mm. In addition to the characters listed in the key as distinguishing *ponape* from *hospes* and *tahitense*, it has a prominent apical band of silvery pubescence on only the first tergite, whereas the latter two species have such bands on the first four tergites in the females.

Like *nigellum*, *ponape* appears to be an endemic species on Ponape and is found in areas of native vegetation.

Type: ♀ ; near hydroelectric plant, Colonia, Ponape; August 9, 1946 (H. K. Townes; along roads, stream banks and bottomland native vegetation). [U. S. National Museum, Type No. 59040.]

Female. Length 9.5 mm., forewing 7.5 mm. Black, head opaque, thorax and abdomen shining; apical half of mandible castaneous. Vestiture silvery (brownish on mesoscutum), short, suberect and moderately dense on clypeus and temples, short and erect on rest of head, longer and erect on thorax, short and decumbent on legs and abdomen, moderately dense on legs, very sparse on abdomen, only the first tergite with a noticeable apical band; tibial calcaria black. Wings clear hyaline and with iridescent reflections, stigma and veins black.

Head: Clypeal lobe impunctate, the apical margin rounded, about 0.4 times the greatest width of clypeus; front finely granulate and with superimposed small, shallow punctures separated by about the width of a puncture; frontal groove moderately well developed and extending from anterior ocellus half the distance toward antennal insertions and terminating in a very small tubercle; vertex about as finely punctate as front, but the punctures separated

by about half the diameter of a puncture; shortest distance between eyes at lower ends (across middle of clypeus) 1.9 times the shortest distance between eyes on vertex; ocellular distance half the diameter of a posterior ocellus and about two-thirds the postocellar distance; relative lengths of first three flagellar segments about 13:11:11; least interocular distance on vertex slightly greater than length of first flagellar segment.

Thorax: Mesoscutum with punctures about twice as wide as on front, many of them separated by less than the diameter of a puncture; scutellum with smaller, somewhat sparser punctures; postscutellum with very small, dense punctures; mesopleuron with subcontiguous punctures equal in size to those on mesoscutum; metapleuron above with several close, longitudinal carinae, elsewhere with small, moderately dense punctures; lateral surface of propodeum separated from dorsal and posterior surfaces by a carina extending from near spiracle almost to apex of segment; dorsal surface with median carina absent, the median sulcus moderately deep, slightly widened toward apex, rest of surface with punctures slightly smaller than on mesoscutum, denser laterally; lateral surface with large, subcontiguous punctures; posterior surface with the usual deep impression on upper half, punctate laterad of this impression, the lower half impunctate and with four strong transverse rugae.

Abdomen: Tergites with minute, rather dense punctures, the second to fifth slightly constricted at apex; second to fifth sternites with slightly larger punctures, those on second separated by several times the diameter of a puncture, those on succeeding sternites progressively more closely punctate.

Wings: Forewing with petiole of second submarginal cell 1.3 times the height of cell; first recurrent vein received near apex of first submarginal cell, second recurrent interstitial with second transverse cubital vein.

Female paratypes vary in length from 9.0 to 10.5 mm. and differ from the above description as follows: Two have the frontal tubercle a short Y-shaped process; first recurrent vein of forewing is interstitial with first transverse cubital vein in one specimen; one specimen, probably a callow, has the hind legs and abdomen castaneous; and the number of strong transverse rugae on the posterior surface of the propodeum varies from four to six.

Paratypes: 1 ♀; same data as type, but August 13, 1946 (H. K. Townes) [USNM]. 1 ♀; Choptokoi, Ponape; February 10, 1936 (Z. Ono). 1 ♀; Tolocolme, Ponape; February 15, 1936 (Z. Ono). 1 ♀; Tamon, Ponape; February 27, 1936 (Z. Ono). 1 ♀; Tamon-Reitao, Ponape; March 1, 1936 (Z. Ono). 1 ♀; Ponape; March 14, 1936 (Z. Ono) [BPB].

Pison oakleyi,⁸ new species

Pison sp. Fullaway, 1913. Proc. Hawaii. Ent. Soc. 2:283 [Guam].—Swezey, 1942. B. P. Bishop Mus. Bul. 172:185 [Guam].

The shining, nonshagreened interspaces on the mesopleuron, strongly infumated wings and low rounded tubercle near middle of third abdominal sternite of male readily distinguish the present

⁸ For R. G. Oakley, Division of Foreign Plant Quarantine, Bureau of Entomology and Plant Quarantine, whose collecting on crop plants in Micronesia forms an important supplement to the material collected by H. K. Townes on native vegetation.

form from the closely related *iridipenne* and *korrorense*. Like the other endemic Micronesian *Pison*, *ponape*, *nigellum*, and *esakii*, this is an inhabitant of the native forests.

Type: ♂; Point Ritidian, Guam; June 1945 (J. L. Gressitt). [U. S. National Museum, Type No. 59041.]

Male. Length 6.1 mm., forewing 4.9 mm. Black, shining except head opaque; mandible at tip castaneous. Vestiture sparse, silvery, shining, less noticeable than in *iridipenne*, decumbent on head, legs and abdomen, suberect on thorax, the apical bands on first to fourth tergites narrower and not so dense as in *iridipenne*; tibial calcaria black. Wings strongly infumated with brown and with violaceous reflections, stigma and veins fuscous.

Head: Impunctate clypeal lobe a low triangle in outline; shortest distance between eyes at lower ends (across middle of clypeus) greater than shortest interocular distance on vertex (5.75:4); front granulate and with numerous small, shallow, subcontiguous punctures, the interspaces not so close as to form a network of fine carinae as in *korrorense*; frontal groove present but weak, running from anterior ocellus half the distance toward antennal insertions and terminating in a short carina; punctures of vertex slightly finer than on front, and separated by about the width of a puncture; postocellar distance about twice the ocellular distance and three-fifths the diameter of a posterior ocellus; relative lengths of first three flagellar segments about 10:9:8; shortest interocular distance on vertex very slightly more than the first and second flagellar segments combined.

Thorax: Mesoscutum about as finely and sparsely punctate as vertex, the scutellum and postscutellum equally finely punctate, the latter more sparsely so; mesopleuron with punctures slightly larger than on mesoscutum, usually separated by about the width of a puncture; metapleuron minutely punctate, the upper third more densely so; lateral surface of propodeum separated from dorsal and posterior surfaces by a carina extending almost from the apex of the segment to a point on the dorsal surface halfway to the spiracle; dorsum of propodeum with median carina weak, present only on anterior half, the sulcus also weak but extending to apex, remainder of surface with sparse, delicate punctures separated by several times the width of a puncture (much sparser than in *iridipenne*) and without traces of oblique, discal carinae; lateral surface with slightly larger and much denser punctures; posterior surface with the usual median impression, the upper half with sparse, small punctures, the lower half with a few transverse rugae.

Abdomen: Tergites one to five slightly constricted at apices and with delicate punctures separated by several times the width of a puncture; sternites with the second somewhat more sparsely punctate than the second tergite, the succeeding sternites progressively more densely punctate than the second; third sternite with a small, low rounded tubercle on midline at about the basal third; hypopygium with a rounded impression near the apex, the apical margin broadly and very shallowly emarginate.

Wings: Forewing with petiole of second sumarginal cell subequal to height of cell; first and second recurrent veins interstitial with first and second transverse cubital veins.

Male paratypes vary in length from 5.6 to 6.8 mm. and the first recurrent vein of forewing is proximad of first transverse cubital vein in two specimens.

Allotype: ♀; Mt. Alutom, Guam; June 18, 1946 (H. K. Townes). [U. S. National Museum.]

Female. Length 8.1 mm., forewing 6.1 mm. Similar to type male except as follows: Clypeal lobe with apical margin broadly rounded; shortest distance between eyes at lower ends (across middle of clypeus) 2.3 times the

least interocular distance on vertex; postocellar distance about one-third the diameter of a posterior ocellus; relative lengths of first three flagellar segments about 6:5:5; the shortest interocular distance on vertex slightly more than the length of first flagellar segment; third abdominal sternite not tuberculate.

Paratype females show some variation in the details of venation, occasionally the first recurrent vein being received proximad of the first transverse cubital vein, or the second recurrent distad of the second transverse cubital. The two females from Rota Island have less strongly infumated wings, but are otherwise identical. Additional material from Rota may establish the presence of a distinct subspecies on that island. Paratype females vary in length from 7.0 to 8.1 mm.

Paratypes: 1 ♂; same data as type. 1 ♀, 1 ♂; Guam (D. T. Fullaway). 2 ♀; Ritidian Point, Guam; April 7, 1948 (K. L. Maehler; near damp mud bank). 1 ♀; North Field, Guam; March 7, 1948 (K. L. Maehler). 2 ♀; Haputo Point, Guam; March 10, 1948 (K. L. Maehler) [KLM]. 3 ♀; Haputo Point, Guam; March 14, 1948 (K. L. Maehler; in damp mud on trail). 1 ♀; same data, but March 27, 1948. 1 ♀; same data, but April 29, 1948 (K. L. Maehler; visiting Chinese ink berry). 1 ♀; Tarague, Guam; May 17, 1936 (O. H. Swezey). 1 ♀; Machanao, Guam; June 30, 1936 (R. L. Usinger). 1 ♀; Mt. Alutom, Guam; July 6, 1946 (H. K. Townes). 1 ♀, 1 ♂; Talofoto, Guam; June 16, 1946 (H. K. Townes; edge of native forest). 1 ♂; Talofoto, Guam; December 19, 1947 (K. L. Maehler; on taro leaves). 1 ♀; Sabana, Rota; June 19, 1946 (H. K. Townes; along roadside). 1 ♀; Rota; July 26, 1946 (R. G. Oakley). Two female and one male paratypes will be deposited in the B. P. Bishop Museum, Honolulu.

Pison iridipenne Smith

Pison iridipennis Smith, 1879. Jour. Linn. Soc. Zool. 14: 676 [♀, ♂; Honolulu, Hawaii; type in London].

Typical *iridipenne* apparently occurs only in the Fijis, Samoa, Society Islands, Tuamotus, Hawaii, and the localities in Micronesia listed below. Williams, 1947 (Occ. Papers B. P. Bishop Mus. 18: 331), states that it has been recorded also from Australia, but I can find no other published record to this effect. Specimens from the Philippines are not typical *iridipenne*. It is a member of an exceedingly difficult assemblage of closely related species or subspecies of which females seem almost identical. The males of this group differ especially in the character of the third abdominal sternite, some having it unarmed, others having a median tubercle, a pair of tubercles, or a short transverse ridge. I suspect that adequate populations may show that many of the forms now considered as species, such as *korrorense* Yasumatsu, may have to be reduced to subspecific rank.

This species has been recorded as nesting in holes in timber, or partitioning clay cells of *Sceliphron*. The cells are provisioned with small spiders.

MARSHALL ISLANDS: 8 ♀ ♀; Airek Island, Ailinglapalap Atoll; August 26, 1946 (H. K. Townes).

MARIANA ISLANDS: 1 ♂; Hagoya Lake, Tinian; June 10, 1946 (H. K. Townes). 1 ♀; Tinian; June 8, 1946 (H. K. Townes). 1 ♀; Marpo Valley, Tinian; June 8, 1946 (R. G. Oakley). 1 ♀; Mt. Lasso, Tinian; June 12, 1946 (H. K. Townes; on leaves of *Melanolepis multiglandulosa*).

CAROLINE ISLANDS: 1 ♀ ♀; Mt. Tafeyät, Kusaie Island; July 21, 1946 (H. K. Townes; primary forest, 800-1200 ft. alt.). 1 ♀; Tamon, Ponape Island; February 27, 1936 (Z. Ono) [BPB]. 1 ♀; Dublon Island, Truk Atoll; February 10, 1948 (K. L. Maehler). 1 ♀; Peleliu Island, Palaus; July 23, 1946 (H. K. Townes).

Pison korrorense Yasumatsu

Pison korrorensis Yasumatsu, 1937. Mushi 9: 133, pl. 10, fig. 5 [♀, ♂; Koror Island, Palaus; type in Fukuoka, Japan].—Yasumatsu, 1939. Festschr. 60 Geburtst. E. Strand 5: 83.

As stated under the discussion of *iridipenne*, the present species may eventually have to be treated as a subspecies of the former when adequate material is at hand. I have seen only one female of this complex from the Palaus (Peleliu Island), and it appears to be identical with typical *iridipenne*. Yasumatsu's description of the female of *korrorense* offers no points of distinction between it and *iridipenne*. The male is quite distinct from *iridipenne* in the bituberculate third abdominal sternite and punctuation of front. I am unable to say whether the latter character is the same in the female. My male of *korrorense* also has the dorsum of the propodeum entirely without oblique discal carinae, but since their development is subject to some variation in *iridipenne*, though seemingly always present to some extent, I have not attempted to use it as a key character. Judging from Yasumatsu's description of the female, the dorsum of the propodeum is the same as in my male.

CAROLINE ISLANDS: 1 ♂; Koror Island, Palaus; March 15-25, 1948 (K. L. Maehler).

BIBLIOGRAPHY OF PAPERS ON MICRONESIAN WASPS

- Bequaert, J., and K. Yasumatsu, 1939. Vespoidea of Micronesia. *Tenthredo* 2: 314-328, 4 pls.
- Betrem, J. G., 1928. Monographie der indo-australischen Scoliiden mit zoogeographischen Betrachtungen. *Treubia*, Suppl. Vol. 9: 92.
- Esaki, T., 1938. The occurrence of a Mutillid wasp in Micronesia. *Annot. Zool. Jap.* 17: 431-432, 1 fig.
- Fullaway, D. T., 1913. Report on a Collection of Hymenoptera made in Guam, Marianne Islands. *Proc. Hawaii. Ent. Soc.* 2: 283.
- Holmgren, A. E., 1868. Hymenoptera. K. Svensk. Fregatt. *Eugenies Resa*, Ins., p. 439.
- Swezey, O. H., 1942. Wasps of Guam. *In* *Insects of Guam*. I. B. P. Bishop Mus. Bul. 172: 184-187.
- Townes, H. K., 1946. Results of an entomological inspection tour of Micronesia. Rpt. 14, U. S. Comm. Co. Econ. Surv. Micronesia, pp. 48-51.
- Turner, R. E., 1911. Notes on Fossorial Hymenoptera. III. On Some Species of Thynnidae, Scoliidae and Sapygidae. *Ann. Mag. Nat. Hist.* (8) 7: 308-309.
- Uchida, T., 1933. Revision der japanischen Scoliiden mit Beschreibung der neuen Arten und Formen. *Jour. Faculty Agr. Hokkaido Imp. Univ.* 32: 257, pl. 2, figs. 14, 15.
- van der Vecht, J., 1941. The Indo-australian species of the genus *Ropalidia* (=Icaria). *I. Treubia* 18: 122.
- Williams, F. X., 1945. The Aculeate Wasps of New Caledonia, with Natural History Notes. *Proc. Hawaii. Ent. Soc.* 12: 425.
- Yasumatsu, K., 1937. Sphecoidea of Micronesia. *Mushi* 9: 129-134, 1 fig., 1 pl.
- 1939. Sphecoidea of Micronesia. II. Crabronidae. *Mushi* 12: 153-155, 1 pl.
- 1939. Notes supplementaires sur le genre *Pison* Spinola du Japon. *Festschr. 60 Geburtst. E. Strand* 5: 82-84.
- 1940. Collecting trip to Pagan Island (Marianas). *Akitu* 2: 184-185.
- 1941. Sphecoidea of Micronesia. III. Family Larridae. *Mushi* 14: 44-47, 1 pl.
- 1945. Vespoidea of Micronesia. 2. *Mushi* 16: 35-45, 2 figs.