

Anomura (Crustacea: Decapoda) Collected from the Northern Mariana Islands, Micronesia

Akira Asakura, Taiji Kurozumi and Tomoyuki Komai

Natural History Museum and Institute, Chiba
955-2 Aoba-cho, Chuo-ku, Chiba 260, Japan

Abstract Twenty-eight species belonging to 12 genera in 7 families of crustacean Anomura were recorded from the northern Mariana Islands. These include 1 species of Callianassidae, 6 species of Coenobitidae, 9 species of Diogenidae, 3 species of Paguridae, 1 species of Galatheididae, 7 species of Porcellanidae and 1 species of Hippidae. All species of Callianassidae, Paguridae, Galatheididae and Hippidae are records from the northern Marianas for the first time.

Key words: Crustacea, Anomura, rocky intertidal, subtidal, Mariana.

In May and June 1992, the Natural History Museum and Institute, Chiba (NHMIC) organized the expedition to the northern Mariana Islands, Micronesia, in cooperation with the Department of the Natural Resources (Commonwealth of the Northern Mariana Islands) and the University of Guam Marine Laboratory. In this paper, the anomuran crustaceans collected by the research members are reported. Anomuran fauna of the northern Marianas have been partly revealed, such as hermit crabs of genus *Calcinus* (Wooster, 1982) and of porcelain crabs of genus *Petrolisthes* (Haig and Kropp, 1987; Kropp, 1983, 1987). Remaining taxa has been largely unstudied, and, in the following list, there are a considerable number of species recorded for the first from the northern Marianas.

Methods

The islands investigated were, from north to south, Uracas, Maug North, Maug East, Maug West, Asuncion, Agrihan, Pagan, Alamagan, Guguan, Sarigan, and Anatahan (see Asakura *et al.*, 1994, for detailed map and location of the sampling stations). Most of the specimens were collected in the rocky intertidal areas of the islands, such collection sites being abbreviated as RI in the following list. Collections were also made by SCUBA and skin divers in the subtidal areas, and depth of the collection site was recorded. Collectors (and their initials used in

the list) were Akira Asakura (AA), Taiji Kurozumi (TK) and Hiroshi Harada (HH) of the NHMIC, and Todd Pitlick (TP) of the University of Guam Marine Laboratory. All of the specimens were deposited at the NHMIC, and CBM-ZC is the registration code for crustaceans. Identification was made by Akira Asakura for the families Callianassidae, Coenobitidae, Diogenidae, Porcellanidae and Hippidae, Tomoyuki Komai for the Paguridae, and Keiji Baba of Kumamoto University for the Galatheididae. For representing size of each individual, following measurements are used for each respective taxa; shield length (SL) for hermit crabs (Coenobitidae, Diogenidae, and Paguridae), carapace length (CL) for ghost shrimp (Callianassidae) and mole crab (Hippidae), carapace width (CW) and length (CL) for porcelain crabs (Porcellanidae). Measurements were done to the nearest 0.1 mm with dial calipers or micrometer, being given in the parenthesis in the text in mm. The arrangement of taxa follows McLaughlin (1980). All of shells inhabited by hermit crabs were identified by T. Kurozumi.

List of Collected Species

Infraorder Anomura Superfamily Thalassinoidea Family Callianideidae

1. *Callianidea typa* H. Milne Edwards

Material examined. 1♂(CL=9.9 mm), PAG-

AN-st.D, 3 m deep, under boulder, TK, 27 May, CBM-ZC-1530.

Distribution. Bismark, Japan (Kagoshima, Yaeyama, Tokara, Ogasawara) (Asakura *et al.*, 1993) and now the northern Marianas.

Superfamily Coenobitoidea
Family Coenobitidae

2. *Coenobita brevipennis* Dana

Material examined. 1♂(SL=21.3 mm), AN-TAHAN-st.C, 13 May, TK, CBM-ZC-1561; 1♀(18.1), GUGUAN, alt 50 m, 17 May, TK

Shell. *Turbo setosus* Gmelin.

Distribution. Widely distributed in the Indo-West Pacific (Nakasone, 1988) including Guam (Amesbury, 1980), the Ogasawaras and the Iwo Islands (Miyake, 1982) and now the northern Marianas.

3. *Coenobita cavipes* Stimpson

Material examined. 1♂(SL=4.4 mm), AN-TAHAN-st.A, 11 May, AA, CBM-ZC-1559; 1juv.(3.05), AGRIHAN-st.C, 30 May, TK, CBM-ZC-1560.

Shell. *Littoraria pintado* (Wood).

Distribution. Widely distributed in the Indo-West Pacific from east coast of Africa through the Malay to Bismark Archipelagos. In the Izu-Mariana Arc, the Ogasawaras, the southern Marianas (Miyake, 1982; Nakasone, 1988; Amesbury, 1980), and now Anatahan and Agrihan of the northern Marianas.

4. *Coenobita perlatus* H. Milne Edwards

Material examined. 3♂(SL=9.1–11.3 mm), ANATAHAN-st.A, 11 May, AA, CBM-ZC-1541; 1♀(16.8), ANATAHAN-st.C, 13 May, TK, CBM-ZC-1542; 1♂(5.5), 1♀(3.5), ANATAHAN-st.D, 14 May, TK, CBM-ZC-1543; 14♂(2.0–18.7), 2♀(15.2, 17.2), SARIGAN-st.A, 14 May, TK, CBM-ZC-1544; 1♂(17.1), GUGUAN-st.A, 16 May, TK, CBM-ZC-1545; 4♂(2.9–20.9), 3♀(2.9–5.0), GUGUAN-st.B, 17 May, AA, CBM-ZC-1546; 2♂(5.1, 10.3), 1♀(2.5), 1juv.(2.4), ALAMAGAN-st.A, 19 May, AA, CBM-ZC-1547; 3♀(18.0–18.8), 1ovig.♀(20.0), 3juv.(16.6–18.5), ALAMAGAN-st.B, 9 June, AA, CBM-ZC-1548; 1♂(8.0), 6♀(4.4–16.0), PAGAN-st.A, 24 May, AA, CBM-ZC-1549; 28♂(3.6–23.5), 23♀(3.8–20.5), 3ovig.♀(9.7–19.0), 3juv.(1.5–5.1), PAGAN-st.B, 25 May, AA, CBM-ZC-1550; 1♂(21.9), 5♀(5.7–20.5), 4juv.(3.8–6.1), PAGAN-st.C, 26 May, AA, CBM-ZC-1551; 1♂

(6.5), 3♀(4.4–19.0), 2juv.(2.2, 2.8), PAGAN-st.D, 27 May, TK, CBM-ZC-1552; 8♂(3.6–15.5), 1ovig.♀(10.3), AGRIHAN-st. B, 29 May, AA, CBM-ZC-1553; 4♂(4.1–12.8), 3♀(4.9–15.5), 2juv.(2.4, 4.1), ASUNCION-st. A, 1 June, AA, CBM-ZC-1554; 10♂(5.0–10.6), 20♀(3.4–12.2), 12juv.(2.7–3.7), MAUG EAST-st.A, 2 and 9 June, AA, CBM-ZC-1555; 1♂(5.8), 3♀(3.4–5.3), 3juv.(2.7–3.7), MAUG EAST-st.C, 2 June, TK, CBM-ZC-1556; 1♀(10.5), 3juv.(3.7–4.5), MAUG EAST-st.B, 2 June, TK, CBM-ZC-1557; 2♂(16.4, 19.2), juv.(3.1), MAUG WEST-st.E, 4 June, AA, CBM-ZC-1558.

Shell. *Turbo petholatus* Linnaeus, *Turbo argyrostomus* Linnaeus, *Turbo setosus* Gmelin, *Phasianella solida* (Born), *Nerita guamensis* Quoy and Gaimard, *Nerita plicata* Linnaeus, *Nerita polita* Linnaeus, *Cerithium echinatum* Lamarck, *Rhinoclavis sinensis* (Gmelin), *Littoraria pintado* (Wood), *Vanikoro gueriniana* (Récluz), *Cymatium aquatilis* (Reeve), *Cymatium pileare* (Linnaeus), *Bursa bufonis dunkeri* Kira, *Bursa granularis* Röding, *Morula granulata* (Duclos), *Drupa morum* Röding, *Drupa rubusidaeus* Röding, *Nassa sarta* (Bruguère), *Purpura persica* (Linnaeus), *Polia undosa* (Linnaeus), *Alectrion papillosus* (Linnaeus), *Peristernia nassatula* (Lamarck), *Latirus nodatus* (Gmelin), *Latirus polygonus* (Gmelin).

Distribution. Widely distributed in the Indo-West Pacific from the western Indian Ocean to the Line and Gambier Islands (Haig and Ball, 1988). In the Izu-Mariana Arc, the Ogasawaras, the southern Marianas (Nakasone, 1988; Amesbury, 1980), Maug (Eldredge, *et al.*, 1977) and, now the other islands of the northern Marianas.

5. *Coenobita purpureus* Stimpson

Material examined. 1♂(SL=15.6 mm), MAUG EAST, 2 June, TK, CBM-ZC-1562.

Shell. *Turbo setosus* Gmelin.

Distribution. Previously known only from Japanese tropical waters such as the Ogasawaras and the Ryukyu Archipelago. Nakasone (1987) considered this species as Japan endemic. This is the first record outside of Japan.

6. *Coenobita rugosus* H. Milne Edwards

Material examined. 2♂(SL=10.1, 13.5 mm), 3♀(5.1–9.9), 1ovig.♀(11.3), ANATAHAN-st.A, 11 May, AA and TK, CBM-ZC-1531; 1♂(8.6),

GUGUAN-st.A, 16 May, TK, CBM-ZC-1532; 1 juv.(2.0), GUGUAN-st.B, 17 May, AA, CBM-ZC-1660; 2♂(5.1, 8.9), ALAMAGAN-st.A, 19 May, TK and AA, CBM-ZC-1533; 6♀(5.1–8.3), 1 juv.(2.8), PAGAN-st.A, 24 May, AA, CBM-ZC-1534; 1♂(5.0), 1♀(4.1), PAGAN-st.B, 25 May, AA, CBM-ZC-1535; 2♂(4.0, 10.6), 4♀(3.4–6.5), 3 juv.(1.4–3.1), PAGAN-st.D, 27 May, TK, CBM-ZC-1536; 2♂(3.6, 6.3), 1 juv.(2.6), AGRIHAN-st.B, 29 May, AA, CBM-ZC-1537; 2 juv.(2.4, 4.1), ASUNCION-st.A, 1 June, AA, CBM-ZC-1538; 2♀(7.8, 7.8), 10 juv.(1.7–3.1), MAUG EAST-st.A, 2 June, AA, CBM-ZC-1539; 1 juv.(3.1), MAUG EAST-st.C, 3 June, TK, CBM-ZC-1540.

Shell. *Turbo argyrostomus* Linnaeus, *Turbo setosus* Gmelin, *Phasianella solida* (Born), *Nerita guamensis* Quoy and Gaimard, *Nerita polita* Linnaeus, *Rhinoclavis sinensis* (Gmelin), *Supplanaxis nigra* (Quoy and Gaimard), *Littoraria pinto* (Wood), *Vanikoro guerianiana* (Récluz), *Cymatium aquatilis* (Reeve), *Cymatium nicobaricum* (Röding), *Cymatium pileare* (Linnaeus), *Bursa granularis* (Röding), *Drupa albolabris* (Blainville), *Polia undosa* (Linnaeus), *Alectrion papillo* (Linnaeus), *Peristerina nassatula* (Lamarck), *Latirus nodatus* (Gmelin), *Latirus polygonus* (Gmelin).

Distribution. Widely distributed in the Indo-West Pacific from east coast of Africa to the Line Islands and Tuamotu. In the Izu–Mariana Arc, the Hachijyou Island, the Ogasawaras (Miyake, 1982; Nakasone, 1987), the southern Marianas (Amesbury, 1980), and, now the northern Marianas.

7. *Birgus latro* (Linnaeus)

Material examined. 2♂(SL = 46.6, 74.9 mm), GUGUAN, 17 May, TK and HH, CBM-ZC-1563.

Distribution. Widely distributed in Indo-West Pacific from east coast of Africa to Line and Gambier (Haig and Ball, 1981). In the Izu–Mariana Arc, Maug, Asuncion, Pagan, Guguan, Saipan, Tinian, and Guam of the Mariana Islands, and Palau (Amesbury, 1980).

Superfamily Paguroidea Family Diogenidae

8. *Aniculus aniculus* (Fabricius)

Material examined. 3♂(SL = 16.8–23.5 mm), 1♀(17.8), 4 ovig.♀(18.0–21.8), ANATAHAN-st.A, RI, 11 May, AA, CBM-ZC-1564; 1 ovig.♀

(21.1), 1♂(20.1), GUGUAN-st.B, RI, 17 May, AA, CBM-ZC-1565; 8♂(19.1–24.0), 3 ovig.♀(18.2–22.5), 1♀(21.0), ALAMAGAN-st.A, RI, 19 May, AA, CBM-ZC-1566; 5♂(18.6–21.6), 5 ovig.♀(20.3–28.9), ALAMAGAN-st.B, RI, 9 June, AA, CBM-ZC-1567; 3♂(13.7–23.1), 5 ovig.♀(16.2–21.1), 2♀(11.7, 15.3), AGRIHAN-st.B, RI, 29 May, AA, CBM-ZC-1568; 1♂(17.3), ASUNCION-st.A, RI, 1 June, AA, CBM-ZC-1569; 2♂(19.1, 21.5), 2 ovig.♀(19.7, 20.1), 1♀(18.7), MAUG WEST-st.E, RI, 4 June, AA, CBM-ZC-1570.

Shell. *Turbo setosus* Gmelin.

Distribution. Widely distributed in the tropical central Pacific, including the Caroline Islands, Eniwetok, Bikini, Samoa, Fiji, Funafuti, Tuamotu, Tahiti, and Marquesas (Forest, 1984). In the Izu–Mariana Arc, Kita-Iwo Jima of the Iwo Islands, and Guam and Saipan of the southern Marianas (Forest, 1984), and Maug (Eldredge *et al.*, 1977), now Anatahan, Guguan, Alamagan, Agrihan, and Asuncion of the northern Marianas.

9. *Calcinus elegans* (H. Milne Edwards)

Material examined. 1♂(SL = 3.7 mm), 3♀(2.5–4.0), 4 ovig.♀(4.4–5.3), ANATAHAN-st.B, RI, 12 May, AA, CBM-ZC-1648; 1♂(2.6), 1♀(5.7), 3 ovig.♀(4.5–5.6), SARIGAN-st.A, RI, 15 May, AA, CBM-ZC-1649; 8♂(3.4–9.7), 1♀(4.0), 4 ovig.♀(3.4–4.4), GUGUAN-st.B, RI, 17 May, AA and TK, CBM-ZC-1650; 42♂(2.6–6.2), 19♀(2.5–4.4), 64 ovig.♀(3.4–5.7), ALAMAGAN-st.A, RI, 19 May, AA, CBM-ZC-1647; 1♀(9.1), 1 ovig.♀(5.2), PAGAN-st.A, RI, 24 May, AA, CBM-ZC-1651; 1♂(3.7), PAGAN-st.C, RI, 26 May, AA, CBM-ZC-1652; 16♂(2.7–8.0), 7♀(2.8–5.0), 14 ovig.♀(3.2–6.6), PAGAN-st.D, RI, 27 May, AA and TK, CBM-ZC-1653; 12♂(2.8–10.4), 5♀(3.1–7.2), 16 ovig.♀(3.1–8.7), AGRIHAN-st.B, RI, 29 May, AA, CBM-ZC-1654; 2♂(2.6, 3.9), 3♀(4.0–4.7), 2 ovig.♀(3.2, 4.1), ASUNCION-st.A, RI, 1 June, AA, CBM-ZC-1655; 5♂(3.5–5.3), 4♀(3.8–5.5), 7 ovig.♀(2.0–5.2), MAUG EAST-st.A, RI, 2 June, AA, CBM-ZC-1656; 14♂(2.8–7.9), 5♀(2.5–6.2), 31 ovig.♀(3.4–7.2), MAUG NORTH-st.F, RI, 3 June, AA, CBM-ZC-1657; 16♂(1.9–8.0), 16♀(1.8–6.1), 7 ovig.♀(3.9–6.4), 1 juv.(1.8), MAUG WEST-st.E, RI, 4 June, AA, CBM-ZC-1658; 17♂(3.3–6.3), 14♀(2.4–4.5), 19 ovig.♀(2.9–4.7), URACAS-st.A, RI, 6 June, AA, CBM-ZC-1659.

Shell. *Trochus stellatus* Gmelin, *Clanculus*

stigmatarius A. Adams, *Turbo setosus* Gmelin, *Nerita plicata* Linnaeus, *Cerithium echinatum* Lamarck, *Rhinoclavis sinensis* (Gmelin), *Angiola labiosa* (A. Adams), *Supplanaxis nigra* (Quoy and Gaimard), *Serpulorbis* sp., *Cypraea mauritiana* Linnaeus, *Cymatium aquatilis* (Reeve), *Cymatium hepatica* (Röding), *Cymatium labiosus* Wood, *Cymatium nicobaricum* (Röding), *Bursa bufonis dunkeri* Kira, *Bursa granularis* (Röding), *Mancinella intermedia* (Kiener), *Morula granulata* (Duclos), *Morula uva* (Röding), *Maculotriton serrialis* (Deshayes), *Drupa morum* Röding, *Drupa albolabris* (Blainville), *Drupa grossularia* Röding, *Drupa rubusidaeus* Röding, *Cronia fusconigra* (Pease), *Purpura persica* (Linnaeus), *Coralliophila erosa* (Röding), *Polia undosa* (Linnaeus), *Latirus polygonus* (Gmelin), *Telasco gaudiosus* (Hinds), *Peristerina nassatula* (Lamarck), *Latirus polygonus* (Gmelin), *Strigatella litterata* (Lamarck), *Strigatella turturina* (Souverbie), *Conus coronatus* Hwass, *Conus rattus* Hwass, *Conus tulipa* (Linnaeus).

Distribution. Widely distributed in the Indo-West Pacific from east coast of Africa to the Hawaiian Islands and Tuamotu Archipelago (Haig and Ball, 1988). In the Izu-Mariana Arc, the Ogasawara Islands (Ooishi, 1975; Asakura *et al.*, 1993), Guam of the southern Marianas, and Maug, Asuncion, Pagan, Guguan, (Wooster, 1982), now Anatahan, Sarigan, Agrihan, and Uracas of the northern Marianas.

10. *Calcinus gaimardii* (H. Milne Edwards)

Material examined. 3♂ (SL = 6.3–6.9 mm), 2♀ (3.4, 3.4), 6ovig. ♀ (3.6–5.1), ANATAHAN-st. B, RI, 12 May, AA, CBM-ZC-1598; 1♂ (2.4), 1♀ (3.0), 1ovig. ♀ (3.0), ANATAHAN-st. D, 3 m deep, 14 May, TK, CBM-ZC-1599; 1♂ (3.2), ALAMAGAN-st. A, RI, 19 May, AA, CBM-ZC-1600; 1♂ (3.0), 1ovig. ♀ (3.3), MAUG EAST-st. A, 5 June TK, CBM-ZC-1601; 5♂ (2.4–6.5), 2♀ (2.5, 2.9), 2 ovig. ♀ (3.3, 5.2), MAUG EAST-st. B, 3 m deep, 4 June, TK, CBM-ZC-1602.

Shell. *Trochus stellatus* Gmelin, *Cerithium echinatum* Lamarck, *Modulus tectum* (Gmelin), *Morula uva* (Röding), *Drupa morum* Röding, *Drupa albolabris* (Blainville), *Polia undosa* (Linnaeus), *Conus lividus* Hwass.

Distribution. Widely distributed in the Indo-West Pacific from east coast of Africa to the Hawaiian and Society Islands (Haig and Ball,

1988). In the Izu-Mariana Arc, the Ogasawaras (Ooishi, 1975; Asakura *et al.*, 1993), Guam and Saipan of the southern Marianas, and Asuncion, Pagan, Alamagan, (Wooster, 1982), now Anatahan, and Maug of the northern Marianas.

11. *Calcinus guamensis* Wooster

Material examined. 1♀ (SL = 3.3 mm), GUGUAN-st. B, RI, 17 May, AA, CBM-ZC-1603; 1 ovig. ♀ (3.0), PAGAN-st. D, 3 m deep, 27 May, TK, CBM-ZC-1604; 1♀ (2.7), AGRIHAN-st. B, RI, 29 May, AA, CBM-ZC-1605; 1♂ (2.8), 1♀ (1.8), 1 ovig. ♀ (2.6), MAUG EAST-st. A RI, 2 June, AA, CBM-ZC-1606; 2♂ (1.7, 4.0), MAUG NORTH-st. F, RI, 3 June, AA, CBM-ZC-1607; 1♂ (2.6), MAUG WEST-st. E, RI, 4 June, AA, CBM-ZC-1608.

Shell. *Angiola labiosa* (A. Adams), *Cypraea moneta* Linnaeus, *Morula uva* (Röding), *Drupa albolabris* (Blainville), *Drupa rubusidaeus* (Röding).

Distribution. Asuncion, Pagan, Guguan, and Guam of the Mariana Islands (Wooster, 1982), the Ogasawaras (Asakura, 1992), and also Hawaii (Haig and McLaughlin, 1983), Indonesia (Haig and Ball, 1988) and northwestern Australia (Morgan, 1990).

12. *Calcinus laevimanus* (Randall)

Material examined. 1♂ (SL = 2.1 mm), 1♀ (2.6), 2ovig. ♀ (3.1, 5.4), ANATAHAN-st. A, RI, 11 May, AA, CBM-ZC-1585; 1♂ (4.7), 1ovig. ♀ (5.4), ANATAHAN-st. B, RI, 12 May, AA, CBM-ZC-1586; 3♀ (2.2–6.1), ANATAHAN-st. C, RI, 13 May, AA, CBM-ZC-1587; 1♂ (4.4), ANATAHAN-st. C, 3 m deep, 13 May, TK, CBM-ZC-1588; 2♂ (2.8–5.2), 1♀ (4.9), 1ovig. ♀ (4.7), GUGUAN-st. B, RI, 17 May, AA, CBM-ZC-1589; 4♂ (4.8–6.7), ALAMAGAN-st. A, RI, 19 May, AA, CBM-ZC-1590; 3♂ (3.3–7.0), 10♀ (2.1–4.7), 7ovig. ♀ (3.3–7.2), PAGAN-st. A, RI, 24 May, AA, CBM-ZC-1591; 1♀ (4.0), PAGAN-st. C, RI, 26 May, AA, CBM-ZC-1592; 10♂ (2.4–6.1), 3♀ (2.7–5.0), 2ovig. ♀ (2.7, 2.9), PAGAN-st. D, RI, 27 May, AA, CBM-ZC-1593; 6♂ (2.3–7.0), 3♀ (3.1–3.6), 5ovig. ♀ (3.2–5.4), AGRIHAN-st. B, RI, 29 May, AA, CBM-ZC-1594; 1♂ (4.7), 1♀ (4.0), 2ovig. ♀ (4.9, 5.0), MAUG WEST-st. E, RI, 4 June, AA, CBM-ZC-1595; 1♀ (3.2), MAUG EAST-st. B, coral, 5 June, TK, CBM-ZC-1596; 10♂ (1.9–8.5), 9♀ (2.1–4.7), 3ovig. ♀ (4.0–7.7), ALAMAGAN-st. B, RI, 9 June, AA, CBM-ZC-1597.

Shell. Trochus stellatus Gmelin, *Turbo setosus* Gmelin, *Nerita plicata* Linnaeus, *Nerita polita* Linnaeus, *Puperita bensoni* (Récluz), *Cerithium echinatum* Lamarck, *Rhinoclavis cedonulli* (Sowerby), *Rhinoclavis fasciata* (Bruguière), *Rhinoclavis sinensis* (Gmelin), *Angiola labiosa* (A. Adams), *Strombus microurceum* (Kira), *Cyp-raea maculifera* Schilder, *Mancinella intermedia* (Kiener), *Morula granulata* (Duclos), *Morula uva* (Röding), *Drupa morum* Röding, *Drupa ricinus* (Linnaeus), *Drupa albolabris* (Blainville), *Pur-pura persica* (Linnaeus), *Pollia undosa* (Linnaeus), *Alectrion papillosus* (Linnaeus), *Peristeria nassatula* (Lamarck), *Latirus polygonus* (Gmelin), *Strigatella litterata* (Lamarck).

Distribution. Widely distributed in the Indo-West Pacific from east coast of Africa to the Hawaiian Islands and Tuamotu Archipelago (Haig and Ball, 1988). In the Izu-Mariana Arc, the Ogasawars (Ooishi, 1975; Asakura *et al.*, 1993), Guam of the southern Marianas, and Maug, Guguan, Anatahan, Asuncion, (Wooster, 1982), now Pagan, Agrihan, and Alamagan of the Mariana Islands.

13. *Calcinus latens* (Randall)

Material examined. 3♂(SL=1.9–3.1 mm), ANATAHAN-st.A, RI, 11 May, AA, CBM-ZC-1642; 1♂(5.1), 2ovig. ♀(3.5, 4.8), ANATAHAN-st.B, RI, 12 May, AA, CBM-ZC-1643; 1♀(3.7), GUGUAN-st.B, RI, 17 May, AA, CBM-ZC-1644; 1♂(3.5), 3♀(2.9–3.5), 3ovig. ♀(3.5–3.6), ALA-MAGAN-st.A, RI, 19 May, AA, CBM-ZC-1645; 1 ovig. ♀(3.6), MAUG WEST-st.E, RI, 4 June, AA, CBM-ZC-1646; 1♂(4.9), MAUG EAST-st. B, 5 June, TK, CBM-ZC-1647.

Shell. *Nerita plicata* Linnaeus, *Drupa morum* Röding, *Drupa albolabris* (Blainville), *Drupa rub-usidaeus* Röding, *Strigatella litterata* (Lamarck), *Conus rattus* Hwass, *Conus catus* Hwass.

Distribution. Widely distributed in the Indo-West Pacific from Red Sea and east coast of Africa to the Hawaiian and Gambier Islands (Haig and Ball, 1988). In the Izu-Mariana Arc, the Ogasawaras (Ooishi, 1975; Asakura *et al.*, 1993), Saipan and Guam of the southern Marianas (Wooster, 1982), and, now, Anatahan, Alamagan, Guguan, and Maug of the northern Marianas.

14. *Calcinus seurati* Forest

Material examined. 8♂(SL=1.9–5.8 mm), 9 ♀

(1.6–5.3), 2 ovig. ♀ (4.6–5.0), ANATAHAN-st. A, RI, 11 May, AA, CBM-ZC-1571; 4♂(1.7–2.7), 4 ♀ (1.8–3.4), ANATAHAN-st.C, RI, 13 May, AA, CBM-ZC-1572; 6♂(1.8–2.8), 5 ♀(1.7–2.5), 2ovig. ♀(2.5, 2.6), SARIGAN-st.A, RI, 15 May, CBM-ZC-1573; 25♂(1.2–5.6), 10 ♀(1.8–3.2), 7ovig. ♀ (2.4–3.0), 6juv.(0.9–1.5), GUGUAN-st.B, RI, 17 May, AA, CBM-ZC-1574; 3♂(3.3–4.4), 4ovig. ♀ (2.7–2.8), GUGUAN-st.B, RI, 18 May, TK, CBM-ZC-1575; 7♂(2.2–6.1), 11 ♀(1.2–4.6), 2ovig. ♀ (3.7–4.0), 1juv.(1.0), PAGAN-st.A, RI, 24 May, AA, CBM-ZC-1576; 26♂(2.1–6.1), 14 ♀(2.5–5.4), 12ovig. ♀(2.7–5.0), PAGAN-st. C, RI, 26 May, AA, CBM-ZC-1577; 16♂(1.6–4.9), 15 ♀(2.0–3.6), 3ovig. ♀(3.6–3.9), PAGAN-st.B, RI, 27 May, AA, CBM-ZC-1578; 1♂(4.0), PAGAN-st. D, RI, 27 May, TK, CBM-ZC-1579; 4♂(1.9–3.1), 1ovig. ♀ (2.8), AGRIHAN-st.A, RI, 28 May, AA, CBM-ZC-1580; 38♂(1.9–7.0), 27 ♀(2.0–5.1), 25ovig. ♀ (2.0–4.1), AGRIHAN-st.B, RI, 29 May, AA, CBM-ZC-1581; 1♂(2.6), MAUG EAST-st.A, RI, 2 June, AA, CBM-ZC-1582; 1♂(3.3), MAUG WEST-st.E, RI, 4 June, AA, CBM-ZC-1583; 33♂(0.9–4.9), 14 ♀(1.7–2.5), 7ovig. ♀(2.5–3.4), URACAS-st.A, RI, 6 June, AA, CBM-ZC-1584.

Shell. *Turbo setosus* Gmelin, *Nerita plicata* Linnaeus, *Nerita polita* Linnaeus, *Puperita bensoni* (Récluz), *Cerithium atromarginatum* Dautzenberg and Bouge, *Cerithium columna* Sowerby, *Cerithium echinatum* Lamarck, *Angiola labiosa* (A. Adams), *Supplanaxis nigra* (Quoy and Gaimard), *Littoraria coccinea* (Gmelin), *Littoraria pintado* (Wood), *Nodilittorina* sp. A (cf. *quadrincta feejeensis*), *Strombus mutabilis* (Swainson), *Cypraea mauritiana* Linnaeus, *Casmaria ponderosa* (Gmelin), *Cymatium aquatilis* (Reeve), *Bursa bufonis dunkeri* Kira, *Bursa granularis* (Röding), *Bursa rhodostoma* (Sowerby), *Colubraria tortuosa* (Reeve), *Mancinella intermedia* (Kiener), *Thais muricina* (Blainville), *Morula biconica* (Blainville), *Morula uva* (Röding), *Nassa sarta* (Bruguière), *Cronia fusconigra* (Pease), *Morula granulata* (Duclos), *Maculotriton serriialis* (Deshayes), *Pascuala ochrostoma* (Blainville), *Drupella cornus* (Röding), *Drupa morum* Röding, *Drupa ricinus* (Linnaeus), *Drupa albolabris* (Blainville), *Drupa grossularia* Röding, *Coralliophila costularis* (Lamarck), *Coralliophila neritoidea* (Lamarck), *Pollia undosa* (Linnaeus), *Telasco velatus* (Gould), *Peristernia*

nassatula (Lamarck), *Latirus polygonus* (Gmelin), *Mitra ferruginea* Lamarck, *Strigatella impressa* (Anton).

Distribution. Tuamotu, Society Islands (Forest, 1951, 1953; Holthuis, 1953), and Pagan (Wooster, 1982), now Anatahan, Sarigan, Guguan, Agrihan, Maug, and Uracas of the northern Marianas.

15. *Clibanarius humilis* Dana

Material examined. 16♂ (SL = 1.0–2.9 mm), 7♀ (0.9–2.1), 10ovig.♀ (1.1–2.3), GUGUAN-st.B, RI, 17 May, AA and TK, CBM-ZC-1640; 22♂ (2.6–4.6), 3♀ (2.2–2.7), 36ovig.♀ (2.4–3.8), ALAMAGAN-st.B, RI, 9 June, AA, CBM-ZC-1641.

Shell. *Trochus stellatus* Gmelin, *Turbo setosus* Gmelin, *Nerita plicata* Linnaeus, *Cerithium atromarginatum* (Dautzenberg and Bouge), *Cerithium nesioticum* Pilsbry and Vanatta, *Clypeomorus nympha* Houbriek, *Angiola labiosa* (A. Adams), *Supplanaxis nigra* (Quoy and Gaimard), *Littoraria pintado* (Wood), *Cypraea poraria* Linnaeus, *Distorsio anus* (Linnaeus), *Morula granulata* (Duclos), *Morula striata* (Pease), *Morula uva* (Röding), *Drupa morum* Röding, *Drupa albolabris* (Blainville), *Cronia fusconigra* (Pease), *Polia undosa* (Linnaeus), *Colubraria tortuosa* (Reeve), *Strigatella turturina* (Souverbie), *Conus coronatus* Gmelin, *Conus nanus* Sowerby, *Conus sponsalis* Hwass.

Distribution. Widely distributed in the Indo-West Pacific from west coast of the Indian Ocean through Ryukyu to New Caledonia and Polynesia (Rahayu and Forest, 1992). In the Izu-Mariana Arc, the Ogasawaras (Ooishi, 1975; Asakura *et al.*, 1993). The present data represents a new record for the northern Marianas.

16. *Diogenes* sp.

Material examined. 1 ind. MAUG EAST-st. B, diving, 3 m deep. CBM-ZC-1609.

Remarks. The specimen is badly damaged and can not be identified. Since, in this species, the antennal peduncle is distinctly shorter than the ocular peduncle, it should be placed to the “*gardineri*-group” (Forest, 1957).

Family Paguridae

17. *Pagurixus anceps* (Forest)

Material examined. 3♂ (SL = 0.9–1.2 mm), GUGUAN-st.B, RI, 17 May, AA, CBM-ZC-1610;

6♂ (1.2–1.3), AGRIHAN-st.B, RI, 29 May, CBM-ZC-1611; 1♀ (1.2), MAUG EAST-st.B, RI, 5 June, AA, CBM-ZC-1612; 4♂ (1.1–1.3), 1♀ (1.0), 10ovig.♀ (1.1), ALAMAGAN-st.B, 9 June, AA, CBM-ZC-1613.

Shell. *Cerithium nesioticum* Pilsbry and Vanatta, *Angiola labiosa* (A. Adams), *Supplanaxis nigra* (Quoy and Gaimard), *Littoraria pintado* (Wood), *Littoraria undulata* (Gray), *Morula uva* (Röding), *Cronia fusconigra* (Pease), *Reticunassa pauperus* (Gould).

Distribution. Central Pacific, Philippine, Ryukyu, Palau and the Caroline Islands, Indian Ocean, Red Sea (McLaughlin and Haig, 1983), and now Guguan, Agrihan, and Alamagan of the northern Marianas.

18. *Pagurixus boninensis* (Melin)

Material examined. 10ovig.♀ (SL = 2.1 mm), PAGAN-st.A, RI, 27 May, AA, CBM-ZC-1614.

Distribution. Marshall, Maldive, the Ogasawaras (McLaughlin and Haig, 1984), and now Pagan of the northern Marianas.

19. *Pagurixus* cf. *tweediei* (Forest)

Material examined. 4♂ (SL = 1.8–2.6 mm), MAUG EAST-st.A, RI, 2 June, AA, CBM-ZC-1615; 3♂ (1.2–1.7), 10♀ (1.7–2.1), 10ovig.♀ (1.7), MAUG WEST-st.E, 4 June, AA, CBM-ZC-1616.

Shell. *Cerithium nesioticum* Pilsbry and Vanatta, *Cerithium atromarginatum* (Dautzenberg and Bouge), *Angiola labiosa* (A. Adams), *Supplanaxis nigra* (Quoy and Gaimard), *Littoraria pintado* (Wood), *Morula uva* (Röding), *Cronia fusconigra* (Pease), *Reticunassa pauperus* (Gould).

Distribution. Known with certainty only from Cocos-Keelings Islands (Forest, 1956). Subsequently McLaughlin and Haig (1984) recorded a male specimen from Philippines as *Pagurixus* cf. *tweediei*.

Remarks. Following key to the species of *Pagurixus* given by McLaughlin and Haig (1984), the present Mariana specimens are identified to *Pagurixus tweediei* (Forest), which has been known only by the original description (Forest, 1956) and the subsequent record by McLaughlin and Haig (1984). A few minor differences are apparent between the present Mariana specimens and the original description of *P. tweediei*. The chela of the right cheliped is relatively broader in the present male specimens than in the figured male of syntypes of *P.*

tweediei (1.2 times as long as wide vs. 2.0 times as long). The spine on the dorsodistal margin of the merus of the right cheliped described for the syntypes of *P. tweediei* is not present on our specimens. The dactyl of the left second pereopod is relatively shorter in the present specimens than in the figured syntype (0.8 times as long as propodus vs. 0.9 times as long). Moreover, our Mariana specimens are different from the description of a male specimen assigned to *P. tweediei* with a little doubt by McLaughlin and Haig (1984) in the following respects; deliniations of the dorsomesial and dorsolateral margins of the right palm described for the specimen of McLaughlin and Haig (1984) are absent in the male specimens of the present material, though weak deliniations are sometimes found in the females; the telson is relatively wider with broadly rounded terminal margins, rather than obliquely concave. It is difficult at present to determine whether these differences fall within range of variation of the species, since very little specimens have been described for *P. tweediei*. To establish the status of our Mariana specimens, direct comparison with the syntypes and the specimen described by McLaughlin and Haig (1984) and additional material from various localities are strongly needed.

Superfamily Galatheaidea

Family Galatheididae

20. *Galathea amamiensis* Miyake and Baba

Material examined. 1 ex. MAUG EAST, AA, CBM-ZC-1617.

Distribution. Ryukyu (Miyake and Baba, 1966), Moluccas (Baba, 1979) and now the northern Marianas.

Family Porcellanidae

21. *Petrolisthes borradailei* Kropp

Material examined. 1 juv. (CW × CL = 3.3 mm × 3.7 mm), ANATAHAN-st.D, intertidal, boulder beach, 14 May, TK, CBM-ZC-1618; 2♂ (5.3 × 5.9, 12.9 × 13.2), GUGUAN-st.B, 17 May, TK, CBM-ZC-1619; 1 ecdysis (5.6 × 5.9), PAGAN-st.A, intertidal, boulder beach, 24 May, AA, CBM-ZC-1620; 1♂ (6.7 × 7.4), 1 ovig. ♀ (8.2 × 8.8), MAUG NORTH-st.F, intertidal, boulder beach, 3 June, AA, CBM-ZC-1621; 7♂ (5.0 × 5.4, 5.8 ×

6.1, 6.2 × 6.4, 7.6 × 8.2, 7.8 × 8.5, 8.1 × 8.7, 10.5 × 11.2, 11.6 × 12.4), 4 ovig. ♀ (7.7 × 8.3, 8.0 × 8.7, 8.3 × 8.7, 10.0 × 10.7), MAUG WEST-st.E, 4 June, HH and AA, CBM-ZC-1622.

Distribution. Widely distributed in the Indo-Pacific, including the Loyalty, Kermadic, Seychelle, Solomom, Caroline, Marshall, Ellice, Society, Marquesas, Tuamotsu Islands. In the Izu-Mariana Arc, Saipan and Guam of the southern Marianas, Pagan (Kropp and Eldredge, 1982; Kropp, 1983; Haig and Kropp, 1987), now Anatahan, Guguan, and Maug of the northern Marianas.

22. *Petrolisthes coccineus* (Owen)

Material examined. 1 juv. (CW × CL = 4.1 mm × 4.3 mm), 1♂ (9.8 × 10.2), 1 ovig. ♀ (15.3 × 15.5), MAUG EAST-st.A, 2 June, RI, AA, CBM-ZC-1623; 2♂ (10.0 × 10.3, 13.9 × 14.2), 1 ♀ (7.5 × 7.7), MAUG NORTH-st.F, CBM-ZC-1624; 1 ♀ (3.9 × 4.1), 1 ovig. ♀ (14.0 × 14.7), MAUG WEST-st.E, 4 June, AA, CBM-ZC-1625.

Distribution. Widely distributed in the Indo-West Pacific, including Mozambique, Seychelles, Chagos, Nicobar, Indonesia, the Ogasawaras, Tuamotu, the southern Marianas (Kropp and Eldredge, 1982; Haig, 1983), and now Maug of the northern Marianas.

23. *Petrolisthes lamarckii* (Leach)

Material examined. 1 ovig. ♀ (CW × CL = 5.6 mm × 6.4 mm), ANATAHAN-st.B, intertidal, boulder beach, 12 May, AA, CBM-ZC-1626.

Distribution. Widely distributed in the Indo-West Pacific from east coast of Africa (Mozambique, South Africa, Madagascar) to the Line Islands and Tuamotu Archipelagos, the area including most of islands of Oceania (Kropp and Eldredge, 1982; Kropp, 1983; Haig, 1989). The present data represents a new record for the northern Marianas.

24. *Petrolisthes mesodactylon* Kropp

Material examined. 4♂ (CW × CL = 2.6 mm × 2.6 mm, 3.2 × 3.0, 4.1 × 4.1, 5.2 × 5.0), 3 ♀ (2.8 × 2.8, 2.8 × 2.9, 3.5 × 3.5), 1 ovig. ♀ (5.2 × 4.7), ANATAHAN-st.C, intertidal, boulder beach, 13 May, AA, CBM-ZC-1627; 4♂ (3.5 × 3.6, 3.5 × 3.7, 5.1 × 5.2, 5.3 × 5.5), MAUG WEST-st.E, intertidal boulder beach, 4 June, AA, CBM-ZC-1628.

Distribution. Previously known only from the Izu-Mariana Arc, i.e., Kita-Iwo-Jima in the Iwou Islands, and Anatahan, Guguan, Pagan

(Kropp, 1983), and now Maug of the northern Marianas.

25. *Petrolisthes miyakei* Kropp

Material examined. 1♂(CW×CL=11.8 mm×13.3 mm), 1ovig.♀(10.8×10.9), MAUG NORTH-st.F, 3 June, AA, CBM-ZC-1629; 1♂(14.4×15.5), 1♀(6.2×6.4), 4ovig.♀(10.4×11.2, 11.2×11.7, 12.4×12.7, 13.4×13.9), MAUG WEST-st.E, 4 June, HH and AA, CBM-ZC-1630.

Distribution. Guam (Kropp, 1983), New Caledonia (Haig, 1989), and now Maug of the northern Marianas.

26. *Petrolisthes pubescens* Stimpson

Material examined. 2♂(CW×CL=4.8 mm×5.3 mm, 7.4×7.6), 1ovig.♀(6.8×7.0), MAUG EAST-st.A, 2 June, AA, CBM-ZC-1631; 1♂(9.4×9.4), MAUG NORTH-st.F, 3 June, AA, CBM-ZC-1632.

Distribution. The Indo-West Pacific from the Indian Ocean to Maruquesas Islands. In the Izu-Mariana Arc, Guam of the southern Marianas, Anatahan, Pagan (Kropp and Eldredge, 1982; Kropp, 1986), and now Maug of the northern Marianas.

27. *Pachycheles garciaensis* Ward

Material examined. 1♂(CW×CL=3.6 mm×3.3 mm), 2ovig.♀(3.6×3.3, 3.8×3.4), MAUG EAST-st.A, RI, 2 June, AA, CBM-ZC-1633.

Distribution. The Indo-West Pacific, including Madagascar, Chagos, Ryukyu, the southern Mariana (Haig, 1966), and now Maug.

Superfamily Hippoidea

Family Hippidae

28. *Hippa pacifica* (Dana)

Material examined. 4 carapaces (CL=14.5–28.5 mm), AGRIHAN-st.D, upper sandy shores, AA, 30 May, CBM-ZC-1634.

Distribution. Widely distributed in the Indo-West Pacific, including Hawaii, the Ogasawaras, Palau (Miyake, 1982), and now the northern Marianas.

Acknowledgments

Cordial thanks are due to Prof. Keiji Baba, Faculty of Education, Kumamoto University, for identifying specimens of Galatheididae and to Dr. Roy K. Kropp, Battelle Ocean Sciences, for providing us with useful information and literature.

References

- Amesbury, S. S. 1980. Biological studies on the coconut crab (*Birgus latro*) in the Mariana Islands. Univ. Guam Tech. Rep. 66: 1–39.
- Asakura, A. 1992. New record of the intertidal hermit crab, *Calcinus guamensis* Wooster, 1982, from Japan, with comments on Japanese *Calcinus*. J. Nat. Hist. Mus. Inst., Chiba 2: 37–40.
- Asakura, A., T. Ohba, S. Miyano, T. Furuki, T. Kurozumi and H. Harada. 1994. Outline of the biological expedition to the northern Mariana Islands, Micronesia. In Asakura, A. and T. Furuki (eds.), Biological Expedition to the Northern Mariana Islands, Micronesia. Nat. Hist. Res., Special Issue (1): 1–11.
- Asakura, A., S. Nishihama, and Y. Kondo. 1993. Studies on the biology and ecology of the intertidal animals of Chichijima Island in the Ogasawara Islands. I. List of collected species with comments on some species. Atoll Res. Bull. 383: 1–17.
- Baba, K. 1979. Expédition Rumphius II (1975). Crustacés parasites, commensaux, etc. VII. Galatheid crustaceans (Decapoda, Anomura). Bull. Mus. natn. Hist. nat., Paris, 4^e sér. A 3: 643–657.
- Eldredge, L. G., R. T. Tsuda, P. Moore, M. Chernin and S. Nevdecker. 1997. A Natural History of Maug, northern Mariana Islands. Univ. Guam Tec. Rep. 43: 1–87.
- Forest, J. 1951. Remarques sur quelques Paguridea du genre *Calcinus* a propos de la description de deux especes nouvelles de Polynesia Oriental; *Calcinus seurati* et *Calcinus spicatus*. Bull. Soc. Zool. France 76: 83–99.
- Forest, J. 1953. Crustacés Décapodes marcheurs des illes de Tahiti et des Tuamotu. 1. Paguridea. Bull. Mus. natn. Hist. nat., Paris 25: 555–561.
- Forest, J. 1957. Les Pagures du Viêt-Nam. I. Le genre *Diogenes* Dana. Bull. Mus. natn. Hist. nat., Paris 28: 524–532.
- Forest, J. 1984. Révision du genre *Aniculus* (Decapoda, Diogenidae). Crustaceana, suppl. 8: 1–91.
- Haig, J. 1966. A review of the Indo-Pacific species of genus *Pachycheles* (Porcellanidae, Anomura). pp. 285–294. Proc. Symp. Crustacea.
- Haig, J. 1983. Porcellanidae (Decapoda, Anomura) from the Seychelles, western Indian Ocean. Crustaceana 45: 279–289.
- Haig, J. 1989. Porcellanidae (Decapoda, Anomura) collected during MUSORSTOM 1 and 2. Résultats des Campagnes MUSORSTOM 5: 93–101.

- Haig, J. and E. E. Ball. 1988. Hermit crabs from north Australian and eastern Indonesian waters (Crustacea Decapoda: Anomura: Paguroidea) collected during the 1975 Alpha Helix Expedition. Rec. Aust. Mus. 40: 151-196.
- Haig, J. and R. K. Kropp. 1987. *Petrolisthes eldredge*, a new porcellanid crab from the Indo-West Pacific, with redescription of two related species. Micronesica 20: 171-186.
- Haig, J. and P. McLaughlin. 1983. New *Calcinus* species (Decapoda: Anomura: Diogenidae) from Hawaii, with keys to the local species. Micronesica 19: 107-121.
- Holthuis, L. B. 1953. Enumeration of the decapod and stomatopod Crustacea from Pacific coral islands. Atoll Res. Bull. 24: 1-66.
- Kropp, R. K. 1983. Three new species of Porcellanidae (Crustacea: Anomura) from the Mariana Islands and a discussion of Borradaile's *Petrolisthes lamarckii* complex. Micronesica 19: 91-106.
- Kropp, R. K. 1987. A neotype designation for *Petrolisthes tomentosus* (Dana), and description of *Petrolisthes heterochrous*, new species, from the Mariana Islands. Proc. Biol. Soc. Wash. 99: 452-463.
- Kropp, R. K. and L. G. Eldredge. 1982. Macroinvertebrates. In Randall, R. H. and L. G. Eldredge (eds.), Assessment of Shoalwater Environments in the Vicinity of the Proposed OTEC Development at Cabras Island, Guam. Univ. Guam Tec. Rep. 70: 107-131.
- McLaughlin, P. A. 1980. Comparative Morphology of Recent Crustacea. W. H. Freeman and Comp. 177 pp. San Francisco.
- McLaughlin, P. A. and J. Haig. 1984. A review of *Pagurixus* (Decapoda, Anomura, Paguridae) and descriptions of new species. Crustaceana 47: 121-148.
- Miyake, S. and K. Baba. 1966. Description of galatheidids collected from coral reefs of the Ryukyu Islands. J. Fac. Agr. Kyusyu Univ. 14: 57-79.
- Miyake, S. 1982. Japanese Crustacean Decapods and Stomatopods in Color. I. Macrura, Anomura and Stomatopoda. 261 pp. Hoikusha, Osaka.
- Morgan, G. J. 1990. A collection of Thalassinidea, Anomura and Brachyura (Crustacea: Decapoda) from the Kimberley Region of northwestern Australia. Zool. Verh., Leiden. 265: 1-90.
- Nakasone, Y. 1988. Land hermit crabs from the Ryukyus, Japan, with a description of a new species from the Philippines (Crustacea, Decapoda, Coenobitidae). Zool. Sci. 5: 165-178.
- Ooishi, S. 1970. Marine invertebrate fauna of the Ogasawara and Volcano Islands collected by Ooishi, Y. Tomida, K. Izawa and S. Manabe. In Report on the Marine Biological Expedition to the Ogasawara (Bonin) Islands, 1968. pp. 75-104. Toba Aquarium, Toba.
- Rahayu, D. L. and J. Forest. 1992. Le genre *Clibanarius* (Crustacea, Decapoda, Diogenidae) en Indonésie, avec la description de six espèces nouvelles. Bull. Mus. natn. Hist. nat., Paris, 4^e sér. A 14: 745-779.
- Wooster, D. S. 1982. The genus *Calcinus* (Paguridea, Diogenidae) from the Mariana Islands including three new species. Micronesica 18: 121-162.