

THE *COLPOCEPHALUM* (MALLOPHAGA: MENOPONIDAE) OF THE PELECANIFORMES¹

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Abstract

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Five species of the genus are discussed and illustrated, including a new species, *C. occidentalis* from *Pelecanus occidentalis*. The lectotype is designated for *C. unciferum* Kellogg, fixing the type-host as *Pelecanus erythrorhynchos*. A key is given to the species.

As a continuation of the study of the menoponid bird lice of the large comb-bearing *Colpocephalum*-complex, it is my intent here to review the status of the species of *Colpocephalum* Nitzsch, 1818, that are known to occur on members of the Pelecaniformes. At the present time there are four names within this genus referable to hosts of this bird order, with two of these from the Pelecanidae and two from the Fregatidae. Since these lice have not been adequately described and have not had their status evaluated in any modern study, this paper presents a redescription of each recognized species, the description of a new species, and a key to permit identification of members of this group.

The following generalities hold true for the *Colpocephalum* species studied here and, for brevity, will not be repeated in subsequent descriptions.

Head with preocular and occipital nodi and associated carinae well developed; broad shallow preocular notch. Margin of temple with 2 very long setae on each side. Both pairs of occipital setae minute. Gula more darkly pigmented only across anterior portion, evenly rounded posteriorly. Subocular comb row with only 2 widely spaced setae immediately anterior to it. Sitophore sclerite of hypopharynx as in Fig. 3. Terminal antennal segment longer than wide, undivided, and not concealed beneath head. No ventral spinous processes.

Margin of pronotum with 16 setae; without developed prosternal plate; no prosternal setae other than usual minute pair. Oblong mesosternal plate. Metanotum with only 2-4 minute medioanterior setae; metasternal plate roughly trapezoidal. Femur III each with 3-4 ventral comb rows; posterior margin of male femur III with 2 stout medium setae, thicker and longer than for female.

Abdomen with marked sexual dimorphism. Female abdomen with some tergites tripartite; female tergites I-III somewhat longer than IV-VIII; male tergites undivided, of equal length. Sternite III with 2 comb rows on each side. Vulval margin posteriorly flattened, with medium setae; laterally with auxiliary row of hooked setae; female anus fringed with fine short to medium setae, with inner dorsal setae; female with inner reticulate structure of genital chamber preceded anteriorly by a small ring-like structure. Male genitalia with well-developed genital sclerite having medioposterior process and pair of pointed lateroposterior projections; penis well developed, unbarbed to slightly barbed distally.

All specimens studied represent material mounted on slides. Measurements are given in millimeters. The value in parentheses following a statement of range is the mean. Reference to tergites, pleura, or sternites, unless specifically stated to the contrary, refers to the abdomen. The nomenclature of the hosts follows that of Peters (1931).

The following three species form a compact group that is very closely related morphologically to the members of the *zebra*-group from the Ciconiiformes (Price and Beer 1965). They are known only from birds of the genus *Pelecanus* (Pelecanidae), with each species of louse being associated with only one of the three subgenera of the Pelecanidae.

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***Colpocephalum eucarenum* Burmeister**

Colpocephalum eucarenum Burmeister, 1838, *Handb. Ent.* 2: 439. Type-host: *Pelecanus onocrotalus* L.

FEMALE. As in Fig. 2. Middorsal head setae short, but not minute. Gular setae 6 + 6 or 6 + 7. Pronotum with 6 median marginal setae usually longer than lateral ones. Metanotal margin with 10 setae, only outermost seta long; metasternal plate with 9-11 short to minute setae. Tergites V-IX tripartite, IV or III-IV pale medially and possibly also divided. Marginal tergal setae, aside from postspiracular setae, of fairly uniform length on any segment, usually without any extending halfway across following tergite: I, 12-14; II-III, 17-21 (18.2); IV, 15-18 (16.5); V-VI, 16; VII, 14-16; VIII, 11-13. Minute anterior tergal setae of quite variable number: I, 0; II-III, 1-10 (4.7); IV, 2-13 (6.3); V-VIII, 1-10 (5.2). Postspiracular setae long to very long on II-III, VI, and VIII, much shorter on I, IV, V, and VII. Last segment marginally with 2 very long setae on each side, a total of 6-7 short setae lateroanterior to these, and 4 short to medium inner posterior setae; without anterior tergal setae; median plate of last segment with microtrichia over entire surface (Fig. 4). Sternal setae: I, 4-7 (5.6); II-VII, 34-55 (42.5). Sternites VII-VIII not fused. Vulva with 30-41 (37.0) marginal setae, 35-39 (37.0) anterior setae in addition to lateral hooked setae. Anus not indented dorsally; ventral anal fringe with 30-36 (32.2) setae, dorsal fringe with 36-44 (40.8); 10-13 (11.4) inner dorsal setae. Ring-like structure of genital chamber as in Fig. 10, 0.060-0.075 wide. Dimensions: preocular width, 0.43-0.45; temple width, 0.58-0.59; head length, 0.49; prothorax width, 0.41; metathorax width, 0.54-0.56; total length, 2.88-2.92.

MALE. Head and thorax essentially as for female, except for slightly wider head anteriorly and for chaetotaxy of femur III. Abdomen as in Fig. 5. Marginal tergal setae with shorter setae among longer, but longest, exclusive of postspiracular setae, typically not extending over halfway across following tergite: I, 10-16 (13.3); II, 16-22 (19.4); III-IV, 17-21 (18.7); V-VII, 15-18 (16.1); VIII, 12-13. More anterior tergal setae: I, 0-3 (0.9); II, 8-18 (12.9); III-IV, 12-26 (19.7); V-VI, 17-36 (27.1); VII-VIII, 32-46 (38.1). Postspiracular setae long to very long on I-VIII. Last segment rounded, with 2 very long setae on each side, a total of 11 or so long setae lateroanterior to these, and 4 short inner posterior setae; without anterior tergal setae; 15-22 (18.6) mostly long posterior marginal setae. Many more sternal setae: up to 20 on I, 85 or so on II, 60 on III, over 100 on IV-VII, and 80 or so on VIII. Genital plate with about 30-35 setae. Genitalia as in Fig. 6, with long slender unbarbed penis (Fig. 1) and genital sclerite as in Fig. 7. Dimensions: preocular width, 0.47-0.49; temple width, 0.57-0.60; head length, 0.47-0.49; prothorax width, 0.38-0.41; metathorax width, 0.49-0.52; total length, 2.45-2.51; genitalia width, 0.11-0.12; genitalia length, 0.82-0.89.

REMARKS. This species is in many respects close to the ciconiiform louse *C. scalariforme* Rudow (Price and Beer 1965). The shorter marginal pronotal and marginal tergal setae, the short postspiracular setae on V, the comparatively longer sternal setae, and the microtrichial vestiture on the median tergal plate of the last segment will separate the females; males of *C. eucarenum* have fewer marginal and anterior tergal setae on the anterior segments and longer marginal tergal setae. In some of these features, the female is thereby closer to *C. mycteriae* Price and Beer, but again the lengths of the postspiracular, marginal pronotal, and marginal tergal setae will afford separation; the males of these two species are conspicuously different in both tergal and sternal chaetotaxy.

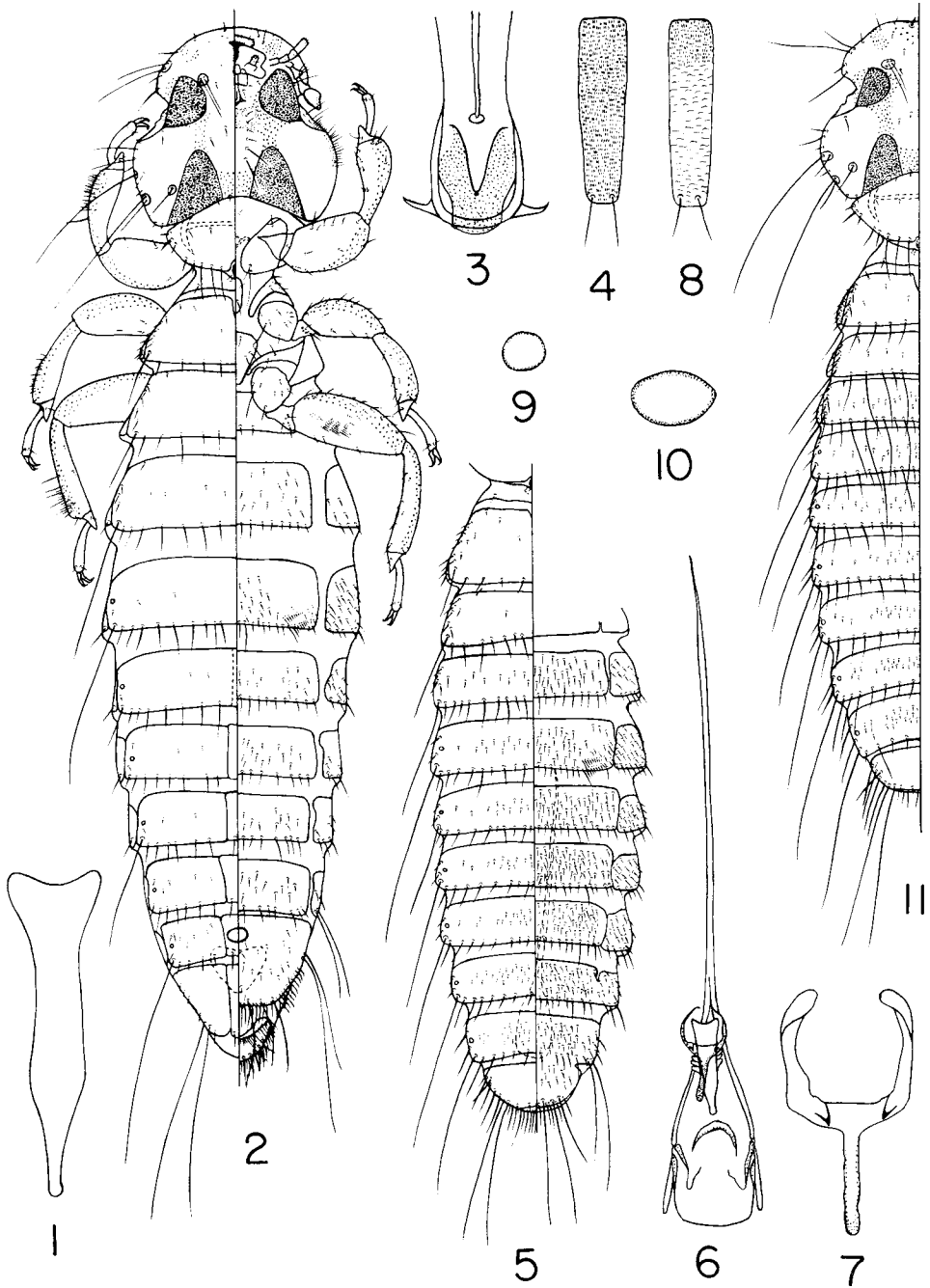
The specimens from *Pelecanus rufescens* Gmelin are slightly smaller than the *P. onocrotalus* material, but otherwise there is excellent agreement.

MATERIAL. 22 ♀♀, 21 ♂♂, *Pelecanus onocrotalus*, Uganda, Kenya; 3 ♀♀, 4 ♂♂, *P. rufescens*, Sudan, Belgian Congo.

***Colpocephalum unciferum* Kellogg**

Colpocephalum unciferum Kellogg, 1896, *Proc. Calif. Acad. Sci.* (Series 2) 6: 140. Type-host: *Pelecanus erythrorhynchos* Gmelin.

FEMALE. Much as for *C. eucarenum*, but with the following differences. Gula with 5-6 setae on each side. Tendency for more marginal tergal setae on II, 18-24 (21.6), and III, 18-24 (20.6); longer marginal tergal setae, especially on I-II or I-III, on which several setae extend over halfway across following tergite, much as in Fig. 11. Slightly smaller dimensions: preocular width, 0.40-0.41; temple width, 0.55-0.57; head length, 0.43-0.45; prothorax width, 0.39-0.40; metathorax width, 0.50-0.53; total length, 2.57-2.88.



Figs. 1-7. *Colpocephalum eucaenum* Burmeister: 1, penis; 2, female; 3, sitophore sclerite of hypopharynx; 4, median tergal plate of last female segment; 5, male pterothorax and abdomen; 6, male genitalia; 7, male genital sclerite.

Figs. 8-9. *C. occidentalis* n. sp.: 8, median tergal plate of last female segment; 9, inner structure of female genital chamber.

Figs. 10-11. *C. unciferum* Kellogg: 10, inner structure of female genital chamber; 11, dorsal male.

MALE. Likewise close to *C. eucarenum*, but differing as follows. All available specimens with pair of short stout spiniform setae dorsoanteriorly on head (Fig. 11). Tendency for more marginal tergal setae on III, 21-24 (22.4); IV, 19-22 (20.8); V, 19; VI, 17-20 (18.4); VII, 16-18 (16.6). Longer marginal tergal setae, especially on I-II or I-III, with some extending over halfway to entirely across following tergite (Fig. 11). Tergite I with 0-13 (5.8) anterior setae. Stronger lateral setae on posterior abdominal segments, with at least those on VII nearly as prominent as those on VIII. Setae on posterior margin of last segment shorter and fewer, 7-12 (9.1); last tergite with 0-9 (3.8) anterior setae. Slightly smaller dimensions: preocular width, 0.43-0.45; temple width, 0.56-0.57; head length, 0.43-0.45; prothorax width, 0.38-0.39; metathorax width, 0.49-0.50; total length, 2.19-2.59; genitalia width, 0.11; genitalia length, 0.84-0.93.

REMARKS. Kellogg (1896) described *C. unciferum* from specimens taken from both the White Pelican, *Pelecanus erythrorhynchos*, and the Brown Pelican, *P. occidentalis* L., simply considering his specimens as a type-series without holotype and thereby not fixing either pelican species as the type-host. The status of *C. unciferum* has remained unchanged to date, being held to occur on both hosts (Hopkins and Clay 1952; Emerson 1964). Carriker (1957), in a study of Kellogg types, was unable to locate the type-series of *C. unciferum* and thus could not clarify the situation.

In the course of this study, I have had available excellent series of lice from both pelicans and have found what I believe to be good differentiating features between both sexes of both series. Subsequently, I was able to obtain Kellogg's type-series from the University of California to confirm that these differences held true for that material. The problem then revolved around which host to designate the type-host, thereby enabling the description of a new species from the lice of the other host. Since Kellogg (1896) gives a full illustration of only a male and bases the large portion of his verbal description on the male, and since his only series with males, based on material sent me, is from *P. erythrorhynchos*, I have selected this pelican to be the type-host of *C. unciferum*. The male on one of three slides bearing identical data and numbered 6xC is hereby designated the lectotype, the specific slide number has been altered to 6xC-2, and the slide has been appropriately labelled and returned to the Kellogg collection.

MATERIAL. 1 ♀, 3 ♂♂, *Pelecanus erythrorhynchos*, a portion of Kellogg's type-series of *Colpocephalum unciferum*, Lawrence, Kansas, 1895; 17 ♀♀, 7 ♂♂, *P. erythrorhynchos*, U.S.A., Canada; 2 ♀♀, Mute pelican, no locality.

Colpocephalum occidentalis n. sp.

TYPE-HOST: *Pelecanus occidentalis* L.

FEMALE. Generally quite close to *C. unciferum*, but with the following differences. Median tergal plate of last segment covered with microtrichia only on anterior portion, lightly sculptured on remainder (Fig. 8). More setae in dorsal anal fringe, 51-59 (53.7), and tendency for more inner dorsal anal setae, 10-16 (13.0). Ring-like internal structure of genital chamber distinctly smaller, only 0.035-0.045 wide, more nearly circular, with thinner margin (Fig. 9). Of generally smaller dimensions: preocular width, 0.38-0.39; temple width, 0.52-0.54; head length, 0.42-0.44; prothorax width, 0.37; metathorax width, 0.46-0.49; total length, 2.28-2.51.

MALE. Close to *C. unciferum*, but with the following differences. Head without dorso-anterior pair of short stout spiniform setae (28 of 34 specimens with setae slender, hair-like; 6 of 34 with thickened setae, but attenuated and not as thick and blunt as for *C. unciferum*). Tendency for fewer anterior tergal setae on IV, 12-24 (15.8); V, 13-24 (16.9); VI, 12-20 (16.1); VII, 19-31 (23.8); VIII, 19-37 (25.7). Fewer total setae lateroanterior to very long setae on last segment, 6-7 (6.7). Fewer posterior marginal setae on last segment, 3-8 (5.3). Of somewhat smaller dimensions: preocular width, 0.42-0.45; temple width, 0.52-0.55; head length, 0.41-0.44; prothorax width, 0.35-0.37; metathorax width, 0.43-0.47; total length, 2.10-2.30; genitalia width, 0.10; genitalia length, 0.62-0.82.

REMARKS. The microtrichial distribution on the median plate of the last tergite and the size and shape of the ring-like internal structure of the genital chamber will separate the female of *C. occidentalis* from both *C. eucarenum* and

C. unciferum. The fewer anterior tergal setae, fewer setae on the posterior margin of the last segment, longer marginal tergal setae on the anterior segments, and smaller size separate the male of *C. occidentalis* from that of *C. eucarenum*. The absence of the anterior spiniform head setae and certain quantitative features of abdominal chaetotaxy distinguish the male of *C. occidentalis* from that of *C. unciferum*.

MATERIAL. Holotype ♀ (USNM), on Brown Pelican, Galveston Is., **Texas**, 19 June 1946, K. C. Emerson (KCE #16). Paratypes from *P. occidentalis*: 2 ♀♀, 4 ♂♂, same data as holotype; 3 ♀♀, 1 ♂, Cape San Lucas, **Gulf of California**, 19 January 1940, G. Augustson; 8 ♀♀, 5 ♂♂, Vieques, **Puerto Rico**, 7 February 1953, T. Tibbetts; 1 ♀, Gulfport, **Mississippi**, 2 March 1941, G. G. Rohwer; 1 ♀, Doca Legues Cayos, **Cuba**, 8 September 1930, H. S. Peters; 1 ♀, 5 ♂♂, Pass-a-Grille, **Florida**, 19 March 1930, W. G. Fargo; 1 ♂, Bird Is., **Texas**, 24 July 1929, W. J. Woolston & F. Harper; 5 ♀♀, 9 ♂♂, Covenas, Bolivar, **Colombia**, 8 January 1949, M. A. Carriker, Jr.; 1 ♀, 2 ♂♂, Nicocli, Bolivar, **Colombia**, 26 January 1950, M. A. Carriker, Jr.; 4 ♀♀, 6 ♂♂, **California**, March 1939, Meinertzhagen Coll. 12852; 1 ♀, Grand Bayou, **Louisiana**, 10 December 1933; 1 ♀, 1 ♂, Patilla Pt., **Panama**, L. H. Dunn; 1 ♀, Pacific Grove, **California**, 1895, V. L. Kellogg (from type-series of *C. unciferum*); 1 ♀, Bay of Monterey, **California**, 1896, V. L. Kellogg; 4 ♀♀, 5 ♂♂, Caroni Swamp, **Trinidad**, 16 January 1961, T. Clay.

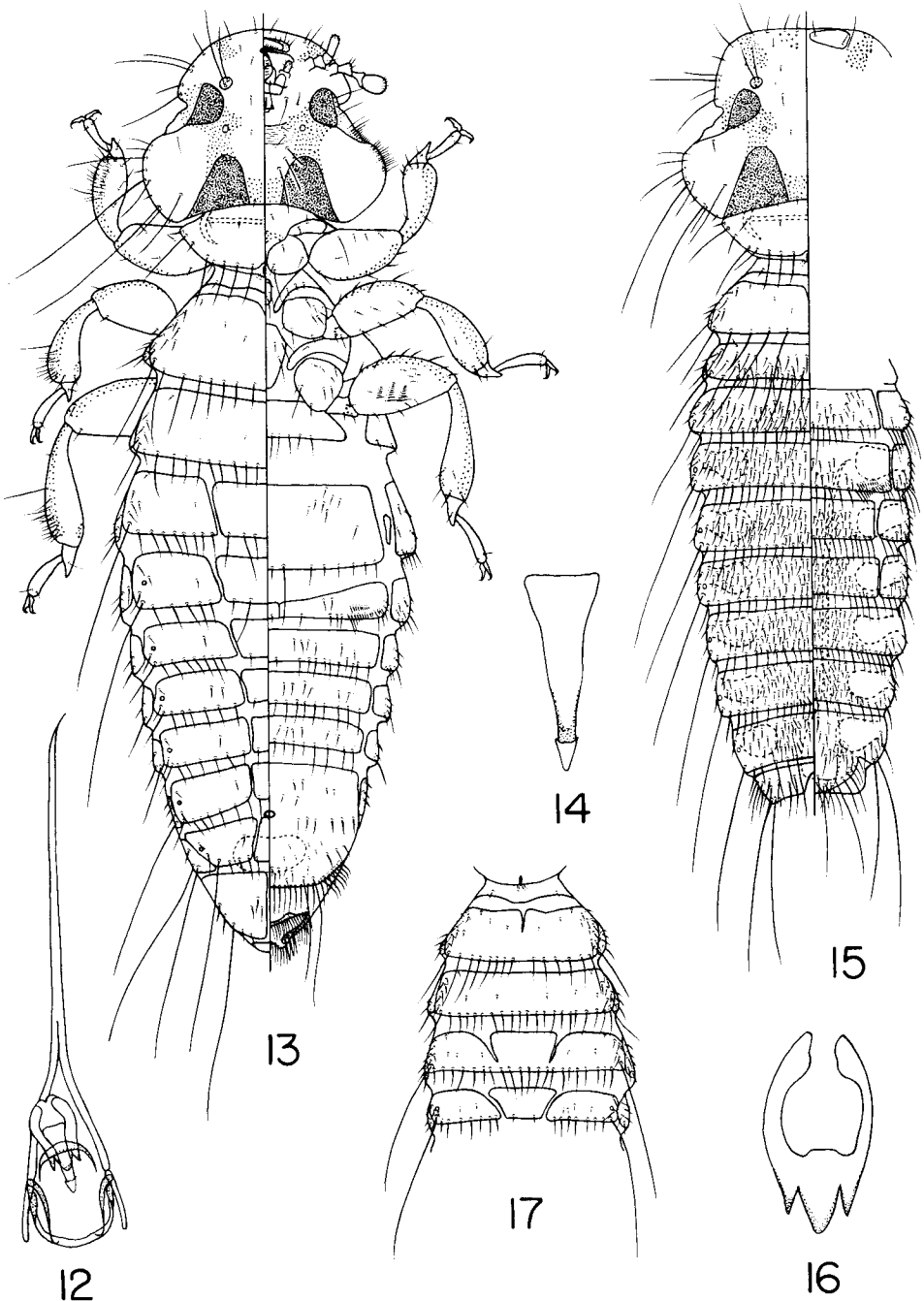
The following two species are known to occur only on birds of the genus *Fregata* (Fregatidae), one being from a Western Hemisphere host and the other being from birds distributed predominantly in the Pacific and oriental regions. They are morphologically quite different from the three species from *Pelecanus* and do not show such a marked similarity to any of the ciconiiform groups of *Colpocephalum* as in the foregoing species.

Colpocephalum angulaticeps Piaget

Colpocephalum angulaticeps Piaget, 1880, Pediculus: 569. Type-host: *Fregata minor* (Gmelin).

FEMALE. As in Fig. 13. Minute middorsal head setae. Gular setae 4 + 4 or 4 + 5. Pronotal margin with 10 long, 6 shorter setae. Metanotal margin with 15-18 predominantly long setae; metasternal plate with 9-11 short to medium setae. Tergites II-VIII distinctly tripartite, with median plate widest on II-III and narrowing to VII-VIII. Marginal tergal setae, aside from postspiracular setae, of fairly uniform length on any segment: I, 20-23 (21.4); II, 24-25; III, 17-21 (19.0); IV, 16-18 (16.6); V-VII, 14-16 (15.7); VIII, 9-10. Up to 8 minute to short anterior setae on each of tergites I-VIII. Postspiracular setae very long only on II-III and VIII, much shorter on I and IV-VII. Pleuron of VIII extending well onto dorsal surface. Last tergite divided at midline; marginally with 1 very long seta on each side, a total of 4 short setae lateroanterior to these, and 4 short inner posterior setae; with 5-8 short medioanterior setae; small ventral median plate, wider than long. Sternal structure as shown, with sternite II enlarged, III short and apparently tripartite. Sternal setae: I, 8-11 (9.8); II, 28-34 (31.0); III, 10-13 (11.8); IV-VI, 26-34 (29.6); VII, 23-28 (25.0). Sternites VII-VIII fused. Vulva with 21-26 (22.8) marginal setae, 34-43 (39.4) anterior setae in addition to lateral hooked setae. Anus indented dorsally; ventral anal fringe with 49-55 (51.8) setae, dorsal fringe with 50-62 (54.6); 5-7 inner dorsal setae. Dimensions: preocular width, 0.32-0.34; temple width, 0.46-0.49; head length, 0.31-0.33; prothorax width, 0.32-0.34; metathorax width, 0.45-0.50; total length, 1.62-1.82.

MALE. As in Fig. 15, differing considerably from female. Head broader and more squared anteriorly, with distinct pair of ventroanterior plates. Pronotum much as for female, but with fifth seta from corner often longer. Metanotal margin with 10 setae, all long. Marginal tergal setae, aside from postspiracular setae, short to medium on II-VII, longer on I and VIII: I, 13-18 (15.5); II-VI, 20-31 (24.7); VII, 19-23 (21.0); VIII, 12-15 (14.3). Numerous short anterior tergal setae: I, 14-42 (26.0); II, 31-75 (48.0); III-VII, 55 to over 100; VIII, 49-80 (63.3). Postspiracular setae long to very long on I-VIII. With well-developed dark



Figs. 12-16. *Colpocephalum angulaticeps* Piaget: 12, male genitalia; 13, female; 14, penis; 15, male; 16, male genital sclerite.
 Fig. 17. *C. spineum* Kellogg, dorsal female pterothorax and abdominal segments I-III.

internal lateral thickenings in III-VIII. Last segment flattened posteriorly, with deep medio-posterior indentation; 2 very long setae on each side, a total of 5-7 setae lateroanterior to these, and 2-3 short to minute inner posterior setae. Last tergite with 11-19 (13.8) medium to long anterior setae. Sternal setae: I, 4-16 (9.1); II, 26-56 (41.4); III, 20-34 (25.9); IV, 45-80 (56.3); V-VII, 55 to over 100; VIII, 34-50 (41.3). Genital plate with 27-45 (34.8) setae. Genitalia as in Fig. 12; penis as in Fig. 14, pigmented except for distal weakly barbed portion; genital sclerite as in Fig. 16, with broad blunt medioposterior process and prominent lateroposterior pointed projections. Dimensions: preocular width, 0.33-0.39; temple width, 0.43-0.50; head length, 0.31-0.35; prothorax width, 0.30-0.36; metathorax width, 0.34-0.41; total length, 1.46-1.56; genitalia width, 0.08; genitalia length, 0.61-0.64.

REMARKS. The tergal divisions of the female, abdominal chaetotaxy and shape of the male, along with a number of other features, very clearly separate specimens of *C. angulaticeps* from any of the *Colpocephalum* known from the Pelecanidae, and no further discussion of this is necessary. The distribution of this species seems to be primarily among species of *Fregata* occurring in the Pacific and oriental regions.

MATERIAL. 23 ♀♀, 21 ♂♂, *Fregata minor*, Pacific Ocean, China Seas, Hawaii, Amirante Is., Bikini; 5 ♀♀, 9 ♂♂, *F. ariel* (G. R. Gray), Maldive Is., Ceylon.

Colpocephalum spineum Kellogg

Colpocephalum spineum Kellogg, 1899, *Occ. Pap. Calif. Acad. Sci.* 6: 38. Type-host: *Fregata aquila* = *Fregata magnificens* Mathews.

FEMALE. Extremely close to that of *C. angulaticeps*, the only difference noted associated with the incomplete division of tergite II (Fig. 17). All specimens I studied have both sides lacking the complete separation of the median plate, as illustrated.

MALE. Apparently inseparable from males of *C. angulaticeps*.

REMARKS. The separation of *C. angulaticeps* and *C. spineum* is not profound, being associated only with tergite II of the female, but it is of such a nature as to dictate that it is best to retain the separate identities of these series at least for the present. In 21 of 23 females of *C. angulaticeps* the median plate of tergite II is completely separated, as in Fig. 13; 2 of the 23 have an incomplete division on one side only, complete division on the other. Thus, this character seems to be consistent to a sufficient degree. Kellogg (1899) describes *C. spineum* from a single male, this being of no value with our present knowledge in associating it with one species or the other; however, since it was taken from *F. magnificens* from Panama, there is no reason to assume that it does not represent *C. spineum* as interpreted here.

MATERIAL. 43 ♀♀, 77 ♂♂, *Fregata magnificens*, U.S.A., Inner Hebrides, Colombia, Canal Zone, Bahama Is., Samoa.

Key to the Species of Pelecaniform *Colpocephalum*

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|---|------------------------|
| 1. ♀: Tergite II tripartite (occasionally incompletely divided), IX bipartite with median terminal plate (Fig. 13). ♂: Dense abdominal tergal chaetotaxy of short setae and indented last segment (Fig. 15); genitalia as in Figs. 12, 14, 16 | 2 |
| ♀: Tergite II not tripartite, IX tripartite (Fig. 2). ♂: Sparser abdominal tergal chaetotaxy of minute setae and last segment not indented (Figs. 5, 11); genitalia as in Figs. 1, 6, 7 | 3 |
| 2. ♀: Tergite II completely tripartite (rarely incomplete division on one side only) (Fig. 13). ♂: Inseparable from below. On Pacific and oriental <i>Fregata</i> spp. <i>angulaticeps</i> Piaget | |
| ♀: Tergite II incompletely tripartite, as in Fig. 17. On <i>Fregata magnificens</i> | <i>spineum</i> Kellogg |

3. Longer marginal setae, aside from postspiracular setae, on tergites I-III extending less than halfway across following tergites (Fig. 2). ♂ : With 15 or more mostly long posterior marginal setae on last segment (Fig. 5) *eucaenum* Burmeister
- Longer marginal setae, aside from postspiracular setae, on some of tergites I-III extending at least halfway across following tergites (Fig. 11). ♂ : With 12 or fewer shorter posterior marginal setae on last segment (Fig. 11) 4
4. ♀ : Median tergal plate of last segment with microtrichia only anteriorly (Fig. 8); ring-like genital chamber structure small, as in Fig. 9. ♂ : Head without dorsoanterior pair of short stout spiniform setae *occidentalis* n. sp.
- ♀ : Median tergal plate of last segment completely covered with microtrichia (Fig. 4); ring-like genital chamber structure larger, as in Fig. 10. ♂ : Head with dorsoanterior pair of short stout spiniform setae (Fig. 11) *unciferum* Kellogg

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