

ON THE GENUS *PSEUDOLYNCHIA* BEQUAERT(Diptera: Hippoboscidae)<sup>1</sup>By T. C. Maa<sup>2</sup>

*Abstract:* *Pseudolynchia serratipes* from New Guinea is described as new. Known species are redescribed together with suggestion of several new characters including sensoria on hind tibiae and sensilla on hind tarsi. A new key to species and remarks on the inter- and intrageneric relationships are appended.

Since erected in 1926, *Pseudolynchia* has been the subject of several regional and world revisions (Bequaert 1926 b, 1935 a, 1938 d, 1955; Maa 1963; Theodor & Oldroyd 1964). Comprehensive bibliographies and digest of literature on the biology of the species have also been provided by Bequaert (1953 a, 1953 b, 1955). The following notes include chiefly a description of an unusual new species, and redescrptions of known ones.

*Generic Characters.* To the detailed descriptions by Bequaert (1955) and Theodor *et al* (1964), the following points may be added: Hind tibia with a group of large sensoria on posterior surface near apex. Segments 2 to 4 of hind tarsus slightly to strongly asymmetrical, each with 2 longitudinal series of sensilla. Parameres (♂) unusually strongly articulated with aedeagal apodeme and gonocoxal base, their common basal margin deeply concave; aedeagal apodeme in sexually matured ♂ quite long and narrow in lateral view. Male differing from ♀ in having wing shorter and broader in proportion, fore and mid tarsi ventrally with more apical spines, segment 1 of mid tarsus ventrally with a small patch of short, stout, and either sharp or peg-like spines (absent in ♀), tergite 5 almost always represented by a pair of small transverse plates (not definable in ♀).

*Intergeneric relationship.* The genus is closely related to *Lynchia* sensu Bequaert 1926 and particularly to *Microlynchia* Lutz 1915 and its only unique character is the presence of finger-like processes on scutellum. As mentioned by Maa (*l.c.*), the sexual dimorphism, vibrissal and metabasisternal processes, facial and prescutal pilosity and posterior scutellar truncation are shared by some of the *Lynchia* species-groups; whereas the venation and abdominal features are similar to those in *Microlynchia*. In short, *Pseudolynchia* stands most probably intermediate of *Lynchia* and *Microlynchia* and may be considered primarily an Old World counterpart of the latter.

*Intrageneric relationship.* In my earlier paper (1963), the 3 included species were

1. Partial results of a grant to Bishop Museum from the U.S. National Institutes of Health (AI 01723-08).
2. B. P. Bishop Museum.

classified into 2 very weakly characterized groups. The discovery of the new species here described necessitates a revision of that system. Most probably *serratipes* and *brunnea* represent the 2 extremes in the line of evolution. The little specialized scutellum (the gently sloping hind part, the vestigial finger-like processes, the rounded postero-lateral angles), the shortened area ectal to antennal pit and the long and scarcely asymmetrical hind tarsus in *serratipes* are apparently generalized characters. The relative width of interocular face (*i. e.*, the relative size of eyes), length of palpi, significance of metabasisternal processes, density of prescutal and abdominal setae, and extent of wing-setulae, while being useful for specific distinction, appear to have no, or only secondary, significance in evolution. Following the setting of the 2 extremes within the genus, the remaining 2 species may easily be placed in position, and the 4 species altogether may be allotted into 2 groups, one solely represented by *serratipes* whereas the other includes the remaining 3 species. The present-day distributional center of the genus is apparently in the Ethiopian Region where both *canariensis* and *garzettae* are common and abundant on many wild hosts. The original home of the domestic pigeon, *Columba livia* is believed by some authors to be the Caucasus which is obviously not the original distributional center of the tropical and subtropical genus *Pseudolynchia*. Meanwhile, *serratipes* perhaps may be ranked as the relic of descendents of the very ancient hypothetical ancestor, and *brunnea*, as the form derived from a common close ancestor with *garzettae* and having successfully penetrated the New World, where it became isolated. The hypothesis of the host-parasite evolutionary parallelism is not applicable here. But it may be noted that in the group of *canariensis*, *garzettae* and *brunnea*, the first species has wider host and distributional ranges and perhaps higher population density, and the next 2 species are similar or nearly similar to each other in host preference and have slightly more restricted distributional range.

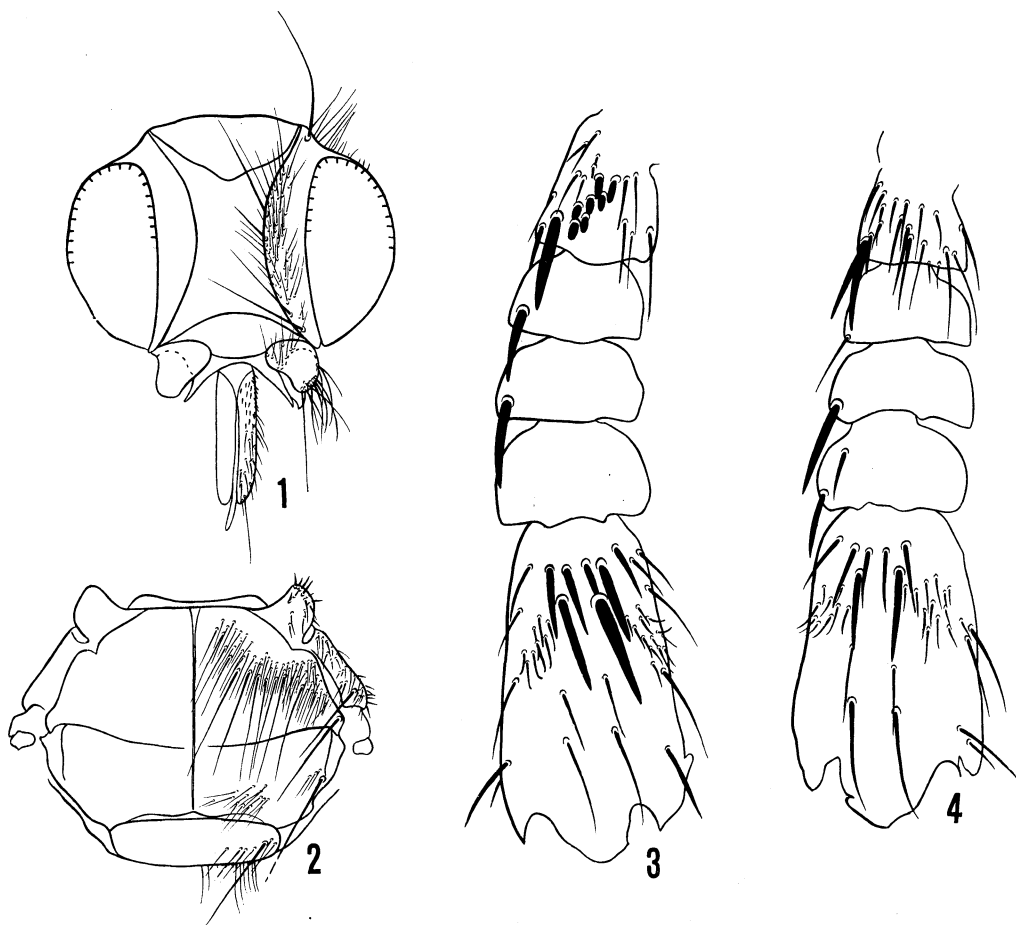
#### KEY TO PSEUDOLYNCHIA SPECIES

1. Wing-setulae extending to vein 2A, leaving only extreme base of cell  $2m+1a$ , entirety of  $2a$  and very small strips in other cells bare. . . . . 2  
 Wing-setulae not extending to vein 2A, posterior 1/5-1/2 of cell  $2m+1a$  and entirety of  $2a$  bare, cell  $1m$  almost always with a conspicuous bare streak near vein  $M_{3+4}$ . . . . . 3
2. Old World species; scutellum posteriorly gently curved and sloping downward and with vestigial finger-like processes; segment 1 of hind tarsus slightly longer than  $2+3+4$ , segment 4 virtually symmetrical. . . . . **serratipes**  
 New World species; scutellum posteriorly abruptly truncate and with well developed finger-like processes; segment 1 of hind tarsus slightly shorter than  $2+3$ , segment 4 distinctly asymmetrical, its postero-apical lobe markedly longer than antero-apical lobe. . . . . **brunnea**
3. Median length of scutellum ca. 1/4 interdistance of bases of scutellar bristles; hind scutellar margin, in dorsal view of insect, straight or virtually straight; interantennal area of frons as wide as or rarely slightly narrower than its distance to eye; prescutum with 20-30 long pale fine setae and before which with 2-3 series of shorter ones; ♂ mid tarsus with group of peg-like modified spines under segment 1 at base. . . . . **canariensis**  
 Median length of scutellum ca. 1/3 interdistance of bases of scutellar bristles; hind scutellar margin, in dorsal view of insect, weakly but distinctly curved; interantennal area of frons always much narrower than its distance to eye; prescutum with 12-18 long, fairly robust and generally black setae and before which, with 1-2 series of shorter ones; ♂ mid tarsus with only pointed setae under segment 1 at base. . . . . **garzettae**

**Pseudolynchia serratipes** Maa, n. sp. Figs. 1, 2, 5, 9, 18.

SE NEW GUINEA: Holotype ♀ (BISHOP 6155), Oriomo, S of Fly R., ex *Ptilinopus jozonus* (BBM-NG 29655), 23. II. 1964, H. Clissold. Holotype in alcohol (right wing and hindleg on slides).

♀. In front view of head, interocular face nearly  $1.4\times$  ( $22:15.5$ ) as wide as eye. Palpus subequal in length to mediovertex. Interantennal area of frons distinctly wider than long along median line and slightly narrower ( $7:9$ ) than its distance to eye. In lateral view of head, area ectal to antennal pit ca.  $1.5\times$  as long as wide. Prescutum at each side with single arcuate series of ca. 15 yellow, long, moderately robust setae and before which with 2-4 series of shorter finer ones; basal punctures of those long setae separated from one another by a distance much more than punctural diameter. Scutellum with



**Figs. 1-4.** *Pseudolynchia* spp. 1, head, *serratipes* ♀; 2, thorax, *serratipes* ♀; 3, right mid tarsus, ♂, ventral view (claws, pulvilli, empodia and ordinary setae on segments 2-4 omitted), *canariensis*, Taiwan, ex domestic pigeon; 4, ditto, *garzettae*, Taiwan, ex *Caprimulgus*.

median length ca. 2/5 interdistance of bases of scutellar bristles; posterior margin very gently curved, clearly visible in dorsal view of insect and rounded off into posterolateral margin; preapical transverse carina weak, virtually straight; area behind that carina gently sloping down to posterior margin; finger-like processes vestigial, hardly longer than wide, with diameters only ca. 1/2 that of scutellar bristles. Prothoracic presternum small, subtriangular, with ca. 6 setae on and near anterior margin; prosternal lobe hardly developed. Metabasisternal process much shorter and slightly blunter than in *Ps. canariensis*. Wing 6.5 mm long; setulae covering entire surface but extreme base of cell  $2m+1a$  and entirety of  $2a$  bare; cell  $1m$  lacking bare strip; cell  $2a$  distinctly narrower than distance from vein  $rm$  to  $M_{3+4}$ . Hind tibia with ca. 25 sensoria on posterior surface. Segments 1-4 of fore, mid and hind tarsi with 1-0-1-0, 1-1-1-0 and 2-2-1-1 black stout apical spines near "inner" margins of venter respectively. Hind tarsus unusually long and narrow, with very numerous sensilla which form microsculpture along "inner" margin; segment 1 in dorsal view slightly longer than  $2+3+4$ , with ca. 35 and 20 sensilla on "inner" and "outer" margins respectively; segment 2 as long as wide; 3 and 4 each scarcely shorter than wide and almost symmetrical; 5 with ca. 15 sensilla each on inner and outer margins. Anterior margin of tergal plate of abdominal segment 6 straight. Setae on dorsum and ventral disc of abdominal membrane uniform in color, length and fineness; those on dorsomedian striolate area fewer in number than in *canariensis* and forming 6 groups (in 3 pairs) of ca. 15 setae each; setae of hindmost ventral row lining before urogenital area significantly darker, more robust than and over  $2\times$  as long as those on disc. Pregenital plate longitudinally linear, with width not greater than diameter of largest setigerous papillae at its vicinity. Setae on infra-anal plate almost entirely situated at posterior 1/2 of that plate. ♂ unknown.

DISTRIBUTION: Papuan Subregion, at present known only from lowland, SE New Guinea.

HOST PREFERENCE: Hardly known, the only record is from *Ptilinopus jozonus* G. R. Gray (Columbidae, Columbiformes) which may not be its true breeding host. Doves and pigeons are very abundant in New Guinea. A good number of them have been collected and examined in recent years by the Bishop Museum field teams but no second specimen of the new species was revealed.

*Systematics.* *Serratipes* represents a combination of characters of all 3 of its congeners. The body size and head structure are similar to that in *canariensis*; the chaetotaxy on prescutum and abdomen, as well as the shape of metabasisternal processes and scutellum, to that in *garzettae*; whereas the extent of wing-setulae, to that in *brunnea*. The most significant distinction of the new species is the vestigial prosternal and scutellar processes and the microsculpture, very long and nearly symmetrical hind tarsus. The scarcity of the apical tarsal spines is also unusual.

**Pseudolynchia canariensis** (Macquart 1840) Figs. 3, 6, 10, 13, 14, 16, 18.

*Synonyms:* *Olfersia testacea* Mcq. 1843, *O. rufipes* Mcq. 1847, *O. falcinelli* Rndn. 1879, *O. maura* Bigot 1885, *O. lividicolor* 1885, *O. capensis* Bigot 1885, *O. exornata* Speis. 1900, *Lynchia simillima* Speis. 1904.

SWEDEN: 1♂ (LUN), Bl. Mörrum, VIII. 1950, T. Gislén.

GREECE: 1♂, 2♀♀ (ZMB ex coll. Loew), Attica, XII. 1864, I. 1865 & IV. 1867 respectively, with ♂ labelled by H. Loew as "*Olfersia aquilarum* m." and one of the ♀♀ det. Speiser as *maura* Bigot.

TUNIS: 1♀ (ZMB 62285), "Tunis".

EGYPT: 1♂ (ZMB ex coll. Loew), Assvan, det. Speiser as *garzettae* Rndn. 1♂ (CNHM), Beni Magdul, Imbala, Giza, ex *Falco tinnunculus rupicolaeformis*, puparium dropped 6. V. 1958, adult emerged 29. V. 1958, H. Hoogstraal; 1♀ (CNHM), same data but puparium dropped 12. V., adult emerged 3. VI.

CAPE VERDE IS.: 1♀ (GNV), Fogo, S. Phillippe, ex *Corvus umbrinus*, VI. 1898, L. Fea.

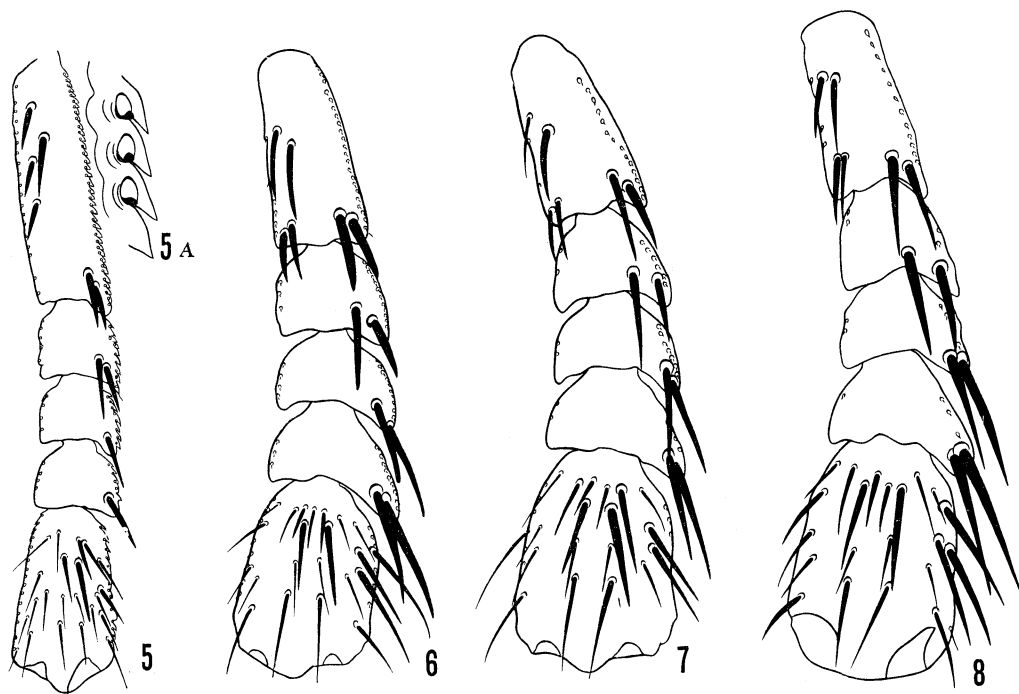
AFGHANISTAN: 1♀ (KBH), Tashki, V. 1948, V. H. Paludan.

NW CHINA: 1♂ (AMS), Shyock Valley betw. Karghalik & Saser Brangsa, 4150-4500 m, Sinkiang, VI-VII. 1930, Nederl. Karakorum Exped.

ERITREA: 1♀ (ZMB ex coll. Bau), Asmara, det. Bau as *maura* Bigot.

CONGO: 1♂, 1♀ (AMS), "El'ville" [Elizabethville], V. 1929.

KENYA: 1♀ (STK), Luazamelo R., naia Kerria, VII. 1911, Lönnerberg, det. Speiser as "*exornata* Speis., ?=*maura* Bigot".



**Figs. 5-8.** *Pseudolynchia* spp. right hind tarsi, ♀♀, ventral view (claws, pulvilli, empodia and ordinary setae on segments 1-4 omitted). 5, *serratipes*; 5a, *serratipes*, marginal sensilla more highly magnified; 6, *canariensis*, Taiwan; 7, *garzettae*, Taiwan; 8, *brunnea*, British Columbia.

S. AFRICA: 1♂, 1♀ (STK), Kuisip, ex *Aquila pennata*, J. Wahlberg. 1♀ (OXF), Pt. Elizabeth with Janson's label "*Olfersia spinifera* Leach?" and Ormerod's label "Janson in... Ormerod's Insects S. Africa p. 61, on pigeons. 1889. E. A. Ormerod".

REUNION I.: 7♂♂, 7♀♀ (PRS), St. Denis, ex pigeon, VII–VIII. 1963, J. G. Pointel.

INDIA: 2♂♂ (KBH), Tranquebar, coll. Westermann.

SUMATRA: 4♂♂, 2♀♀ (KBH), "Sumatra", 1853–1889, P. A. Klein.

JAVA: 1♀ (AMS), "Java?" det. de Meijere as *simillima* Speis. 1♂ (AMS), Batavia, "flog abend ins Contor herein", VIII. 1907, E. Jacobson.

THAILAND: 1♂ (Kasetsart Univ., Bangkok), Dhonburi, IX. 1959.

VIETNAM: 1♀, 15–35 km NW of Phan Rang, XI. 1960, C. M. Yoshimoto.

TAIWAN: 1♀, Taipei, ex pigeon, VIII. 1961, K. S. Lin; 3♂♂, 1♀, Taipei, ex pigeon in market, XI. 1964, C. T. Lin. 1♂, 1♀, Hsinchu city, ex pigeon (PF 6647, 10409), XI. 1959 & IV. 1961, R. E. Kuntz. 12♂♂, 12♀♀, Shihlin nr. Taipei, ex pigeon (PF 5437, 6630, 6641), VIII. 1958, X. 1958 & XI. 1959, Kuntz. 12♂♂, 7♀♀, Puli, Nantou hsien, ex *Streptopelia chinensis formosae* (TMT 172, 308, 309, 441, 442, 567), XII. 1963–I. 1964, T. C. Maa & J. S. Kuo; 2♀♀, same data but ex *S. orientalis orii* (TMT 622, 721). 1♂, 2♀♀, Liukuei, Kaohsiung hsien, ex *S. orientalis orii* (TMT 1696, 1858), III–IV. 1964, Maa & Kuo. 6♂♂, 14♀♀, Tzepeng, Taitung hsien, ex *S. chinensis formosae* (TMT 851, 1033, 1095, 1141, 1320, 1358, 1375), I–II. 1964, Maa & Kuo; 4♂♂, 2♀♀, same data but ex *S. orientalis orii* (TMT 849, 1056, 1321). 1♂, Sanchungpu, Taipei hsien, ex pigeon, II. 1965, J. S. Lien.

U. S. A.: 3♂♂ (KBH), Jefferson County, Florida, F. W. Walker.

W. INDIES: 1♂ (KBH), St. Croix, L. M. Hauschildt.

BRAZIL: 1♂ (KBH), Rio de Janeiro, J. T. Reinhardt.

The "pigeons" in the above list all refer to domestic pigeons. The list represents a fraction of the specimens examined by me and was selected mainly for historical interest. For instance, *aquilarum* Loew is a nom. nud., the Javanese ♀ labelled as *simillima* Speis. is possibly a syntype of that nominal species, the ♀ from Port Elizabeth establishes the identity of "*Olfersia spinifera*" of Janson (1889) (not of Leach) with *canariensis*, and the W Indies and Brazilian specimens collected by L. M. Hauschildt (1840–1913) and J. T. Reinhardt (1816–1882) respectively, are amongst the earliest catches of this species from the New World—According to W. Horn & I. Kahle 1935–37 Ent. Beihefte 2–4: 1–536, Reinhardt's collection went to Kopenhagen Mus. in 1847 and 1854, hence the Brazilian ♂ now at that Museum should have been collected before 1854. Bequaert (1955: 399) pointed out that the first report of the occurrence of *canariensis* Mcq. in the New World was in 1885 when Bigot described the species as *lividicolor*. As shown above, Reinhardt's insect obviously was collected more than 30 years prior to Bigot's description.

♀. In front view of head, interocular face usually ca. 1.5× as wide as eye. Palpus and mediovertex subequal in length. Interantennal area (base of frons) distinctly wider than long along median line and as wide as (rarely slightly narrower than) distance to eye. In lateral view of head, area ectal to antennal pit ca. 3× as long as wide. Prescutum

at each side with 2 arcuate series of 20-30 yellowish long very fine setae and 2-3 series of shorter ones; interdistance of basal punctures of those long setae often subequal to punctural diameter. Scutellum with median length ca.  $1/4$  interdistance of bases of scutellar bristles; posterior margin straight, invisible in dorsal view of insect and subangulate to posterolateral margin; preapical transverse carina strong, straight or practically so; surface behind that carina vertical, abruptly marked off; finger-like processes long, mostly not more slender than scutellar bristles. Prothoracic presternum fairly large, generally trapezoidal, with ca. 10 setae distributed over entire surface; prosternal lobe well developed. Metabasisternal process usually longer, narrower and sharper than in *Ps. garzettae* and *Ps. serratipes*. Wing 4.5-7.5 mm long; setulae distributed as in *garzettae*; cell 2a almost always not or hardly narrower than distance between veins  $rm$  and  $M_{3+4}$ . Hind tibia apically with only ca. 10 sensoria on posterior surface. Segments 1-4 of fore, mid and hind tarsi in most specimens with 1-0-1-0, 2-1-1-0 and 2-2-2-2 black stout apical spines near "inner" margins of venter respectively. Hind tarsus moderately long and broad; its segment 1 in dorsal view hardly longer than 2+3; with ca. 20 and 6 sensilla on "inner" and "outer" margin respectively; segment 2 shorter than wide and slightly asymmetrical, 3 and 4 very significantly so; 5 with ca. 7 sensilla each on inner and outer margins. Setae on dorsum and ventral disc of abdominal membrane not quite uniform in color, length and fineness; those on dorsomedian striolate area in average more numerous than in *garzettae* and *serratipes*, those on ventral disc partly composed of a few distinctly longer and more robust ones, those of hindmost row anterior to urogenital area slightly longer and more robust than elsewhere in membranous area. Pregenital plate as in *garzettae*. Setae on infra-anal plate generally situated largely on posterior  $1/2$  of that plate.

♂. Similar to ♀ except for sexual characters. Segments 1-4 of fore, mid and hind tarsi with 1-0-1-0, 1 (sometimes with an additional minor one)-0 (seldom with a minor one)-1-0 and 2-2-2-2 apical spines respectively; segment 1 of mid tarsus ventrally with 3-7 peg-like modified spines at base. Aedeagus and paramere in profile slightly more robust and more curved than in *garzettae*; aedeagus (in proportion to its basal apodeme) shorter than in latter species.

DISTRIBUTION: Originally found in the Old World tropics and subtropics, spreading to temperate countries in the summer, now established in the New World. Previously recorded from wild hosts in the Mediterranean Subregion, Continental Africa south to the Sahara, Afghanistan, India, Nepal, Thailand, Philippines and Ryukyus. As a result to its parasitism upon domestic pigeons, this is the commonest species of the genus in collections.

HOST PREFERENCE: Polyxenous in the Old World, most highly preferring Columbiformes, next Falconiformes, perhaps also breeding on Cuculiformes, with stray records from 5 other Orders of birds; confined to domestic pigeon in New World. According to Bequaert (1954, 1955), recorded wild hosts were Ciconiiformes (1 sp.): *Hagedashia*; Falconiformes (21): *Accipiter*, *Aquila*, *Buteo*, *Circaetus*, *Circus*, *Falco*, *Gymnogenys*, *Haliaeetus*, *Kaupifalco*, *Lophaetus*, *Melierax*, *Milvus*, *Neophron*, *Polihierax*, *Spizaetus*; Galliformes (4): *Gallus*, *Numida*, *Pternistis*; Columbiformes (15): *Columba*, *Pterocles*, *Streptopelia*, *Treron*, *Turtur*; Cuculiformes (5): *Clamator*, *Crinifer*, *Cuculus*; Strigi-

formes (6): *Asio*, *Athene*, *Bubo*, *Ketupa*, *Otus*, *Tyto*; Coraciiformes: *Coracias*; Passeri-formes (4): *Cinclus*, *Corvus*, *Galerida*, *Temenuchus*. Kartman (1949) noted in Hawaii, 50 juvenile domestic pigeons harboring an average of 2 flies per bird and 100 adults averaging 1.3 flies per bird; whereas Schuurmans Stekhoven *et al.* (1954) found in Argentina, 1–20 flies per squab. For the wild hosts, Maa & Kuo (1965), in Taiwan, examined 19 *Sphenurus sieboldii*, 30 *Streptopelia orientalis* and 56 *S. chinensis* and found their respective infestation rates to be 0, 97 and 96%, and the highest catch per infested bird being 10 flies (average 2.3 flies per infested bird). Thus even for hosts of same bird-family in same locality, there appears to be a certain degree of relative preference.

*Systematics.* This species is chiefly characterized by the dense pale recumbent setae on prescutum and in the ♂, also by the peg-like modified spines under mid basitarsus. The wideness of cell 2a and denseness of abdominal dorsal setae are noteworthy too. It stands closest to *garzettae* but also bears certain structural similarities to *serratipes* and *brunnea*. For their separation, see key and discussions under those species. According to Bequaert (1955: 405), *canariensis* tends to average larger on domestic pigeons than on wild hosts (wing-lengths 5.8–7.5 mm vs. 4.5–6 mm). And since in the New World, it has no “acquired breeding hosts”, it is possible that there exist 2 physiological strains.

Schuurmans Stekhoven *et al.* (1954: 94, as quoted by Bequaert 1955: 407) described segments 2 and 3 of fore tarsus as each with 1 spine in ♀, none in ♂; and mid basitarsus, with 2 spines in ♀, and 5 (in groups of 2 and 3) in ♂. This appears not entirely correct (see above).

*Parasitism by mites.* The available information regarding this phenomenon in this species has been excellently reviewed by Bequaert (1953a: 145–46, 158–59; 1955: 403). Schuurmans Stekhoven *et al.* (1954, as quoted by Bequaert 1953a: 146), in Argentina, reported the rate of mite-infested *Ps. canariensis* ex domestic pigeons was about 12.5% for ♂♂ and 18% for ♀♀ in the most heavily parasitized lot. In Taiwan, I could find no such mites on this fly ex domestic pigeons. Instead, out of 18 ♂♂, 21 ♀♀ ex *Streptopelia chinensis*, 9 ♂♂, 10 ♀♀ were found infested; and out of 5 ♂♂, 6 ♀♀ ex *S. orientalis*, no ♂♂ but 2 ♀♀, infested. The parasitism rate for both lots combined was 42%. The breakdown of sites of mite-attachment was 14 cases under wings, 10 on anterior slope of syntergite 1+2, 6 on remaining area of abdomen, 1 each on frons and gula. The number of mites per infested fly varied from 1 to 10, and in 9 out of 21 cases, mites were found on 2 or more different sites on same individual flies. And in 10 of the 21 cases, there were egg clusters as well.

***Pseudolynchia garzettae*** (Rondani 1879)      Figs. 4, 7, 11, 15, 17, 18.

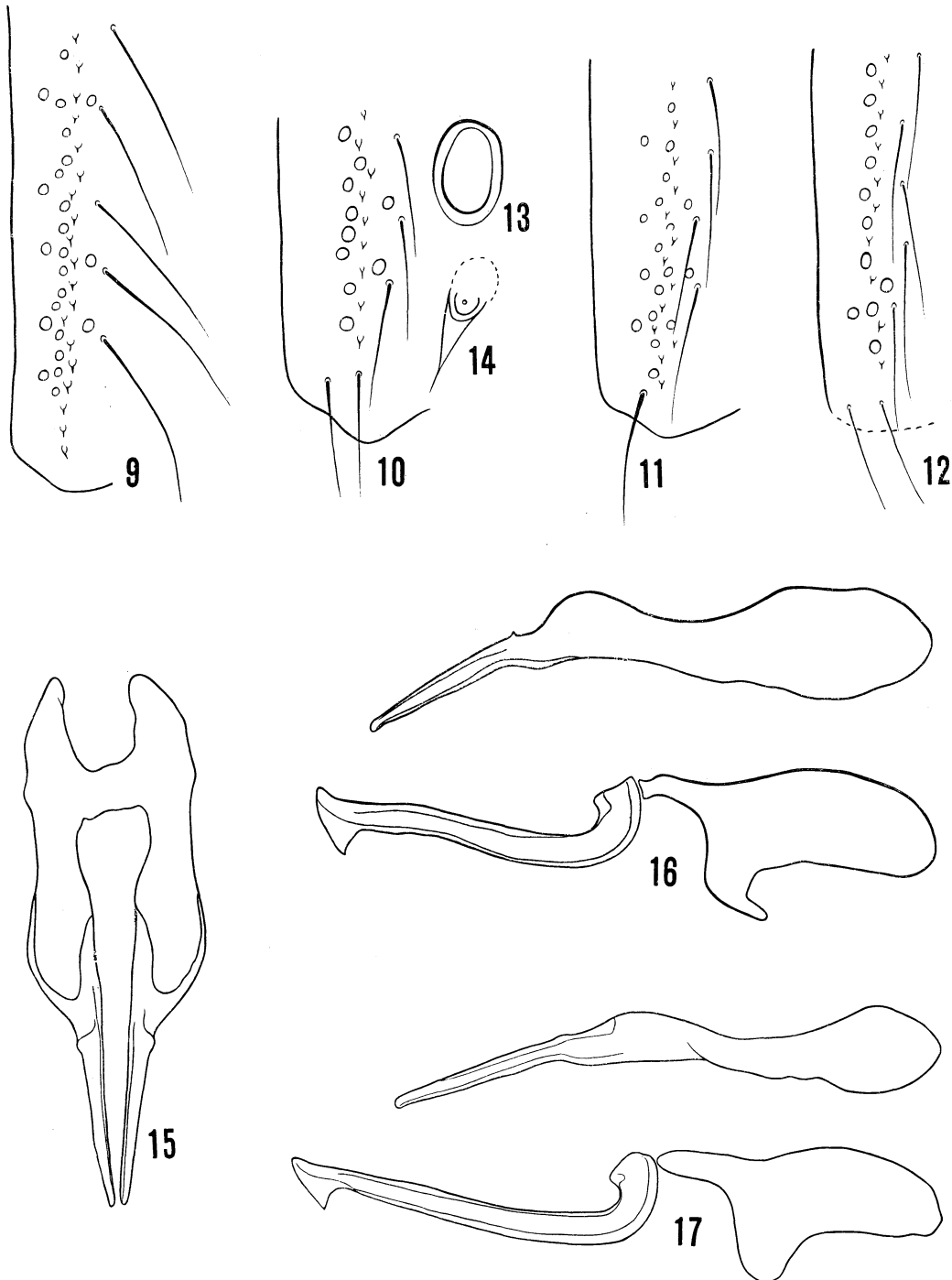
*Synonyms:* *Pseudolynchia fradeorum* Tendeiro 1951, *Ps. rufipes* auctt. nec Mcq.

KENYA: 1♂, 1♀, Kilifi, ex *Caprimulgus clarus*, III. 1963, R. E. Mumford.

SUDAN: 1♂, 1♀ (CNHM), Malakal, Taufikia forest, ex *Ciccaba woodfordii*, IV. 1961.

THAILAND: 2♂♂, 1♀, Chiangmai, Ban Bo Kao, ex *Otus* sp. (SMRL #V 358), I. 1962. 2♂♂, 3♀♀, Ranong, Kapoe, Muang Kluang, ex *O. scops malayanus* (RE 7067), II, 1963, R. E. Elbel. 1♂, 2♀♀, (?) Bangkok, ex *Caprimulgus macrurus* (5E 1501), II. 1965, Migr. Anim. Path. Surv.





**Figs. 9-17.** *Pseudolynchia* spp. 9, posterior surface of ♀ hind tibia (apical part) showing sensilla (in part) and sensoria (marginal setae omitted), *serratipes*; 10 ditto, *canariensis*, Taiwan; 11, ditto, *garzettae*, Taiwan; 12, ditto, *brunnea*, British Columbia; 13, sensorium, more highly magnified, *canariensis*; 14, sensilla, more highly magnified, *canariensis*; 15, ♂ parameres in dorsal view, *garzettae*; 16, paramere and aedeagus in lateral view, *canariensis*; 17, ditto, *garzettae*. Figs. 9-12 drawn to same scale.

TAIWAN: 11♂♂, 20♀♀, Liukuei, Kaohsiung hsien, ex *Capr. affinis monticolus* (TMT 1679, 1708, 1839, 1869, 1870, 1871, 1872, 1873, 1944-46, 2121, 2122, 2123), III-IV. 1964, T. C. Maa & J. S. Kuo.

PHILIPPINES: 1♂, Siaton, Negros Oriental, ex *Capr. macrurus manillensis* (5E 1509), I. 1965, Migr. Anim. Path. Surv. 2♂♂, 3♀♀, same data but BBM-PI 6384, VIII. 1964, N. Wilson.

In addition, I have also 1♀ received from København Mus., labeled "Nabiul-Tanb", ex *Otus* sp., IX. 1938.

♀. In front view of head, interocular face ca. 1.7-2× as eye. Palpus about as long as lunule plus frons (measured along median line). Interantennal area (base of frons) nearly as wide as median length and much narrower than distance to eye. In lateral view of head, area ectal to antennal pit ca. 3× as long as wide. Prescutum at each side with single arcuate series of 13-18 long, rather robust, generally black setae and 1-2 series of shorter finer ones; interdistance of basal punctures of those long setae markedly more than punctural diameter. Scutellum with median length ca. 1/3 interdistance of bases of scutellar bristles; posterior margin very gently curved, weakly visible in dorsal view of insect and subangulate to posterolateral margin; preapical transverse carina fairly distinct, gently curved; area behind that carina rather abruptly deflexed; finger-like processes long, mostly not more slender than scutellar bristle. Prothoracic presternum fairly large, semicircular or trapezoidal, with ca. 6 setae on and near anterior margin; prosternal lobe well developed. Metabasisternal process about as long as wide at base, apically moderately sharp. Wing 5-5.5 mm long; setulae not covering posterior 1/5-1/2 of cell  $2m+1a$  and entirety of  $2a$ ; cell  $1m$  usually with a bare streak near basal 1/2 of vein  $M_{3+4}$ ; cell  $2a$  narrower than interdistance of veins  $rm$  and  $M_{3+4}$ . Hind tibia with ca. 18 sensoria on posterior surface. Segments 1-4 of fore, mid and hind tarsi with, in most specimens, 1-1-1-0, 2-1-1-1 and 2-2-2-2 black stout apical spines near "inner" margins of venter respectively; segment 1 of fore tarsus sometimes with an additional minor spine. Hind tarsus shorter and wider in proportion than in *Ps. canariensis*; segment 1 in dorsal view subequal in length to 2+3, with ca. 14 and 2 sensilla on "inner" and "outer" margins respectively; 2 distinctly shorter than wide, virtually symmetrical; 3 and 4 very distinctly transverse and asymmetrical; 5 with ca. 4 sensilla each on inner and outer margins. Setae on dorsum and ventral disc of abdominal membrane uniform in color, length and fineness; those on dorsum more or less fewer in number than in *canariensis*; those of hindmost row lining before urogenital area slightly longer than at ventral disc. Pregenital plate elongate-triangular, with width at posterior end 2× or more diameter of largest setigerous papillae in its vicinity. Setae on infra-anal plate usually almost entirely situated at posterior 1/2 of that plate.

♂. Similar to ♀ except sexual characters. Segments 1-4 of fore, mid and hind tarsi with same number of apical spines as in ♂ *canariensis*, but segment 4 of mid tarsus usually with 1 small apical spine; segment 1 of mid tarsus ventrally in addition to apical spine (s), with patch of pointed setae at base, no peg-like spines. Aedeagus and paramere in profile slightly more slender and less curved than in *canariensis*; aedeagus (in proportion to its basal apodeme) longer than in latter species.

DISTRIBUTION: Palearctic, said to be common in Continental Africa south to the

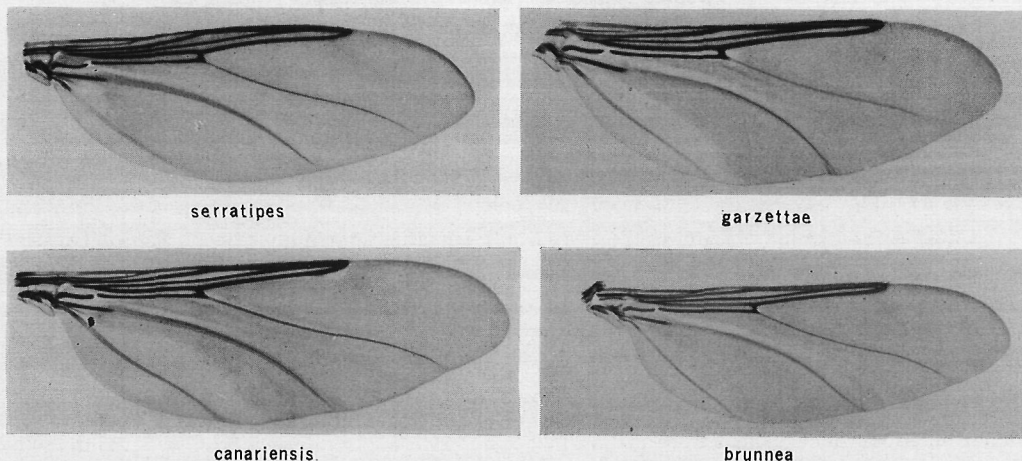


Fig. 18. *Pseudolynchia* species, ♀ wings, not to same scale.

Sahara; found sparingly in the Mediterranean Basin; no previous definite records for the Oriental Region, probably partly due to inadequate collecting and partly to confusion with *Ps. canariensis*.

**HOST PREFERENCE:** Apparently breeding on Caprimulgidae (Caprimulgiformes) and less often on Strigidae (Strigiformes); the occurrence on the other orders of birds almost certainly represents stragglers. According to Bequaert (1953 a, 1953 b), the previously recorded hosts were accipitrid indet. (Falconiformes), *Burhinus* (Burhinidae, Charadriiformes), *Centropus* (Cuculidae, Cuculiformes), *Athene*, *Bubo*, *Ciccaba*, *Tyto* (Strigidae, Strigiformes), *Caprimulgus*, *Macrodipteryx*, *Scotornis*, *Semeiophorus* (Caprimulgidae), *Apus* (Apodidae, Apodiformes), and *Corvus* (Corvidae, Passeriformes). To these, another strigid, *Otus* is here added. Maa & Kuo (1965), in Taiwan, collected and examined 32 *Caprimulgus affinis* and found the infestation rate was 44%, and highest catch per infested bird was 4 flies (average 2.4 flies).

**Systematics.** Although having no unique characters and being closely related to and often confused with *canariensis*, this is certainly a species distinct from the former both in structure (see key) and in host preference. In the shape of head and the chaetotaxy of prescutum and abdomen as well as the host preference, it is rather similar to *brunnea*. At first, Bequaert (1935 a, 1938 d) separated *garzettae* from *canariensis* by the wider and more parallel-sided mediovertex, longer postvertex, longer and narrower interantennal area, shorter and broader humeral callosity, narrower and posteriorly curved scutellum and smaller body size (shorter wing). Later he (1955) discarded all these differences except the shape of interantennal area (but added the shorter, wider and blunter metabasisternal process and the relative length of first 2 antennal segments) and was "not yet fully satisfied of their specific distinction". On the other hand, Theodor & Oldroyd (1964) accepted, out of those listed by Bequaert, the relative width of mediovertex and interantennal area and the shape of scutellum and metabasisternal process as good characters. They added as further differences the narrower frontal emargination, fewer prescutal setae and less extent of lateral distribution of scutellar

processes and described the abdomen and genitalia of both sexes to be as in *canariensis*. I found that (a) the anterior emargination of frons seemingly more easily understandable in terms of the relative length of interantennal area (not including its anterior membranous extension) and the distribution of scutellar processes, varying; (b) the average number of dorsal abdominal setae and the relative width of cell *2a* as well, being a convenient if not quite constant specific character. I have also dissected and directly compared the aedeagi and parameres of the 2 species and am convinced of the slight but reliable differences as here illustrated and described. Theodor & Oldroyd's figure (fig. 87) of the wing of *canariensis*, as evidenced by an examination of their original series from Haifa, Israel, represented an example abnormal in its outline and in the shape of its cell *2a*.

In one of the ♂♂ examined, there are 2 vertical bristles at left side; and in another one, the prothoracic presternum is anteriorly bilobed.

**Pseudolynchia brunnea** (Latreille 1812)      Figs. 8, 12, 18.

♀. In front view of head, interocular face ca.  $1.6 \times (20:12.5)$  as wide as eye. Palpus subequal in length to mediovertex. Interantennal area (base of frons) distinctly wider than long along median line and distinctly narrower ( $5.5:8$ ) than its distance to eye. In lateral view of head, area ectal to antennal pit ca.  $3.5 \times$  as long as wide. Prescutum at each side with single arcuate series of ca. 12 yellow long fine setae and before which with another single series of shorter finer ones; basal punctures of those long setae separated from one another by a distance much more than punctural diameter. Scutellum with median length ca.  $1/3$  interdistance of bases of scutellar bristles; posterior margin very gently curved, poorly visible in dorsal view of insect and subangulate to posterolateral margin; preapical transverse carina strong, very weakly curved; area behind that carina somewhat abruptly sloping down to posterior margin; finger-like processes long, mostly not more slender than scutellar bristles. Prothoracic presternum fairly large, subtriangular, with 6–8 setae on and near anterior margin; prosternal lobe well developed. Metabasisternal process somewhat more slender than in *Ps. canariensis*. Wing (teste Bequaert 1955) 4.8–6 mm long; setulae covering entire surface but cell *1m* often with a bare streak near vein  $M_{3+4}$ ; cell *2a* entirely bare, more or less narrower than distance from vein *rm* to  $M_{3+4}$ . Hind tibia with ca. 12 sensoria on posterior surface. Segments 1–4 of fore, mid and hind tarsi with 1–0–1–0, 1–1–2–0 and 2–2–2–2 black stout apical spines near “inner” margins of venter respectively; spine on segment 2 of mid tarsus rather small. Hind tarsus short, with very few, poorly developed sensilla; segment 1 in dorsal view slightly shorter than 2+3, with ca. 12 and 2 sensilla on “inner” and “outer” margins respectively; segments 2, 3 and 4 each wider than long, 3 hardly asymmetrical, 4 distinctly so; segment 5 apparently lacking sensilla. Anterior margin of tergal plate of abdominal segment 6 nearly straight. Abdomen more sparsely setose than in congeners; setae on dorsum and ventral disc of membrane fairly uniform in color, length and fineness; those on dorsomedian striolate area much fewer in number than in *canariensis*; setae of hindmost ventral row lining before urogenital area significantly longer but hardly darker and more robust than at ventral disc. Pregenital plate similar to that in *canariensis*. Setae on infra-anal plate paler and finer than in *canari-*

*ensis* and largely situated at posterior 1/2 of that plate.

The above description is based upon a single pinned ♀ (CNC) from Hope, Brit. Columbia, IX. 1927, C. H. Young. No ♂♂ are available for examination of genitalia and legs.

**DISTRIBUTION:** Nearctic and Neotropical Regions. Bequaert (1955: 411-16, figs. 81-82) listed it from Canada (Ontario, 48° 33'N), U. S. A. (17 States, E of Rocky Mts), Mexico, Panama, Cuba, Brazil and Argentina (28° S).

**HOST PREFERENCE:** Oligoxenous, confined to Caprimulgidae (Caprimulgiformes), recorded from *Caprimulgus*, *Chordeiles*, *Phalaenoptilus*, *Hydorpisalis*, *Nyctidreanus* and *Setopagis*. Of the 24 records verified by Bequaert (*l.c.*), only one was ex *Hylocichla* (Turdinae, Muscicapidae, Passeriformes) which was apparently an occasional host.

**Systematics.** As mentioned above, this species is here considered the most highly specialized in the genus. This is indicated by the reduction of setae on prescutum and abdomen, shortened hind tarsus, etc., as well as restricted host range (the range of *Ps. serratipes* is practically unknown and is thus unsuitable for comparison). Bequaert (*l.c.*) distinguished it from *canariensis* and *garzettae* chiefly by the more extensive wing-setulae, wider face and smaller body-size (in terms of wing-length). Minor differences noted by him are: relatively longer interantennal area of frons, relatively broader antenna, more pointed pre-alar tip of anepisternum, more slender metabasisternal process, almost bare dorsomedian striolate area of abdomen, fewer setae on inner orbit, thoracic dorsum and abdomen. The interocular face was described by that author as ca. 2× as wide as eye; the palpus, distinctly shorter than mediovertex; and almost all prescutal setae were drawn as if nearly uniform in length and about as long as those on scutum, and apices of cells *1r* and *2r* and base of cell *1m*, as if bare; but these 4 points do not agree well with the unique specimen at hand. Although *brunnea* and *garzettae* can immediately be distinguished by an examination of the extent of wing-setulae and the outline of hind tarsus, they are similar in host preference and other structural characters. Their affinities are slightly more remote versus that of *garzettae* and *canariensis*. The similarities of *brunnea* and *serratipes* in the extent of wing-setulae and in the scarcity of setae on dorsomedian abdominal area are superficial and represent a phenomenon of secondary convergence, since the face, scutellum as well as hind tarsus are quite different. Their placement together in the first couplet of the above key is simply for convenience.

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