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The identity of *Nirmus obtusus* and other *Quadraceps* species (Phthiraptera : Philopteridae) from Clipperton Island and the Galápagos Islands

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The identity of *Nirmus obtusus* Kellogg & Kuwana, 1902 is clarified based on the examination of its holotype, relevant literature and other lice samples from several species of charadriiform birds. The host-louse association between *N. obtusus* and its type host (*Sterna fuscata crissalis* (Lawrence, 1872)) is discussed and deduced to be erroneous. The birds *Tringa incana* (Gmelin, 1789) and *Tringa totanus* (Linnaeus, 1758) are regarded as regular hosts for *N. obtusus*, and evidence is presented supporting the opinion that *T. incana* was the original natural host for the holotype of *N. obtusus*. The present status of this louse species is *Quadraceps obtusus* (Kellogg & Kuwana, 1902); *Degeeriella conformis* Blagoveshtchensky, 1940 is regarded as a junior synonym (new synonymy).

Specimens of five other species of *Quadraceps* included in Kellogg & Kuwana's material are compared with *Q. obtusus* and discussed in relation to their hosts and locality records.

Keywords: Phthiraptera, Philopteridae, *Quadraceps*, *Nirmus obtusus*, new synonymy, erroneous host-records, Clipperton Island, Galápagos Islands

INTRODUCTION

Nirmus obtusus Kellogg & Kuwana, 1902 was described from a single female louse collected on *Sterna fuliginosa* Gmelin, 1788 (=*Sterna fuscata crissalis* (Lawrence, 1872)) from Clipperton Island, by R.E. Snodgrass during the Hopkins Stanford Galápagos Expedition, 1898–1899. Since the original description, no further specimens of *N. obtusus* have been reported from its type host or from any other host. Most of the literature references to *N. obtusus* are merely inclusions of this species in catalogues and checklists (see annotated synonymy below). Eichler (1946) included *N. obtusus* in the genus *Quadraceps* Clay & Meinertzhagen, 1939. This generic placement was followed by other authors, and is also accepted as correct in this paper.

Hopkins & Clay (1952) listed *Q. obtusus* as a valid species, making a brief comment that its type host (*Sterna fuscata crissalis*) was probably an erroneous host. These authors did not give any evidence to support their comment, perhaps considering it outside the scope of their work. But the fact that the species *Quadraceps birostris* (Giebel, 1874), with females clearly different from that of *Q. obtusus*, had also been recorded from *Sterna fuscata* Linnaeus, 1766, together with the lack of additional records of *Q. obtusus*, may have been behind their comment. Złotorzycka (1967 : 727) listed *Q. obtusus* as a species of uncertain taxonomic position, while Emerson (1972) placed it as a junior synonym of both *Q. birostris* on page 136 and *Q. strepsilaris* (Denny, 1842) on page 146!

Kellogg & Kuwana (1902) also described as new four further species which are now included in *Quadraceps* : *Nirmus gloriosus*; *N. paludicola*; *N. separatus* and *N. lepidus* (see Hopkins & Clay, 1952). Clay (in Linsley & Usinger, 1966) selected lectotypes for these species and sank two of them as junior synonyms.

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In the course of my research on the Phthiraptera from the Galápagos Islands I have had access to all the available specimens of the louse collection made by R.E. Snodgrass as member of the Hopkins Stanford Galápagos Expedition during 1898 and 1899 (now housed in the Division of Entomology and Parasitology of the University of California at Berkeley); among them I have located the single female (the holotype) originally described and figured as *Nirmus obtusus*, and most of the specimens of *Quadraceps* recorded by Kellogg & Kuwana (1902). Comparisons between that material and samples of several species of *Quadraceps* from known hosts, and with published descriptions and figures, have enabled me to clarify the identity of *Quadraceps obtusus* and to determine its correct regular hosts. Also, I identified a sixth species of *Quadraceps*, hitherto undetected, collected by that Expedition from a host species also unrecorded in their bird report.

Abbreviations used for institutions are as follows:

CISC – California Insect Survey, Division of Entomology and Parasitology, University of California, Berkeley, California, U.S.A.

MONZ – Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand.

MATERIAL EXAMINED

Quadraceps obtusus (Kellogg & Kuwana, 1902)

Ex *Sterna fuscata crissalis* (Lawrence, 1872): Holotype ♀, Clipperton Island, Eastern Pacific Ocean, 10°20'N – 109°13'W (Slide 1097d in CISC). The original label also reads "(Galapagos)" but Clipperton I. is *not* part of the Galápagos Archipelago.

Ex *Tringa incana* (Gmelin, 1879)*: 6 ♂, 5 ♀, Baja California, Mexico, no date (MONZ); 11 ♂, 8 ♀, Bahía Darwin, Genovesa Island, Galápagos Is, 25 Mar. 1992 (MONZ).

Ex *Tringa totanus* (Linnaeus, 1758): 6 ♂, 7 ♀, Sheffield Park, England, 2 Feb. 1976 (MONZ); 3 ♂, 1 ♀, Mai Po, Hong Kong, 20 Aug. 1988 (MONZ).

Quadraceps birostris (Giebel, 1874)

Ex *Sterna fuscata* Linnaeus, 1766: 4 ♂, 6 ♀, Clipperton Island, Eastern Pacific Ocean, 10°20'N – 109°13'W, Nov. 1898 (Slides 1029b, 1060a, 1060c, 1060d, 1123c in CISC); 3 ♀, Norfolk Island, Southwestern Pacific Ocean, 1944 (MONZ); 4 ♂, 3 ♀, Sand Island, Midway Atoll, Hawaiian Is, 20 July 1962 (MONZ); 3 ♂, 3 ♀, Denham Bay, Raoul Island, Kermadec Is, 23 Dec. 1962 (MONZ); 9 ♂, 9 ♀, same locality, 17 Jan. 1967 (MONZ); 7 ♂, 9 ♀, Kawhia, New Zealand, Dec. 1972 (MONZ); 3 ♂, 4 ♀, Raoul Island, Kermadec Is, 31 Dec. 1972 (MONZ); 8 ♂, 8 ♀, same locality, 15 Jan. 1973 (MONZ); 1 ♂, 3 ♀, same locality, 17 Nov. 1980 (MONZ); 14 ♂, 16 ♀, same locality, 31 Jan. 1982 (MONZ); 8 ♂, 7 ♀, Curtis Island, Kermadec Is, 29 Oct. 1989 (MONZ).

Quadraceps separatus (Kellogg & Kuwana, 1902)

Ex *Anous stolidus* (Linnaeus, 1758): 2 ♂, 4 ♀, Eastern Island, Midway Atoll, Central Pacific Ocean, 20 Jul. 1962 (MONZ); 6 ♂, 5 ♀, Astrolabe Lagoon, Fiji Is, 31 May 1975 (MONZ); 1 ♂, 1 ♀, North Keeling Island, Cocos Is, Eastern Indian Ocean, Dec. 1982 (MONZ); 1 ♂, Curtis Island, Kermadec Is, 19 Oct. 1989 (MONZ); 17 ♂, 17 ♀, Seymour Norte Island, Galápagos Is, 29 Mar. 1992 (MONZ); 12 ♂, 12 ♀, Rábida Island, Galápagos Is, 3 Apr. 1992 (MONZ).

Quadraceps hopkinsi hopkinsi Timmermann, 1952

Ex *Anous minutus* Boie, 1844: 2 ♂, 3 ♀, Sand Island, Midway Atoll, Hawaiian Is, 26–30 Jul.

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*This bird species, the Wandering Tattler, is referred to as *Heteroscelus incanus* in many publications. The nomenclature by Vaurie (1965) is followed here.

1962 (MONZ); 6 ♂, 6 ♀, Meyer Island, Kermadec Is, 19 Jan. 1967 (MONZ); 3 ♂, 3 ♀, Raoul Island, Kermadec Is, 28 Aug. 1973 (MONZ); 6 ♂, 6 ♀, Gardner Island, Phoenix Is, 4°20'S – 175°35'W, 26 Oct. 1978 (MONZ); 12 ♂, 12 ♀, Macauley Island, Kermadec Is, 20 Nov. 1980 (MONZ).

Quadraceps strepsilaris (Denny, 1842)

Ex *Arenaria interpres* (Linnaeus, 1758): 1 ♀, Lyttelton, New Zealand, 11 Sep. 1968 (MONZ); 1 ♂, 2 ♀♀, Pearl & Hermes Reef, Hawaiian Is, 15 Dec 1970 (MONZ); 3 ♂, 3 ♀, Curtis Island, Kermadec Is, 29 Oct. 1989 (MONZ); 1 ♀, Bahía Darwin, Genovesa Island, Galápagos Is, 27 Mar. 1992 (MONZ).

RESULTS AND DISCUSSION

The Hopkins Stanford Galápagos Expedition 1898–1899 lasted 304 days, most of them spent on and around the Galápagos Archipelago. *En route* to their main destination they landed on 2 small isolated islands, Guadalupe (29°15'N – 118°50'W) and Clipperton (10°20'N – 109°13'W) (see Heller, 1903 : 40) where they collected birds from which they removed the lice. Those from Clipperton I. were studied and published by Kellogg & Kuwana (1902) together with the lice collections made in the Galápagos Is by the same collector during that Expedition. No lice were reported from Guadalupe I. by Kellogg & Kuwana (1902).

Research on collections made in localities other than the Galápagos and Clipperton Islands, but from the same and closely related seabird species listed in Kellogg & Kuwana (1902 : 489–491), has shown that an extremely high proportion of the host-louse associations established by those authors for each bird are not an indication of the natural pattern of lice distribution but, almost certainly, the result of gross contamination of lice between different hosts due to human agency. Thompson (1938 : 184) expressed his disbelief at the final conclusion reached by Kellogg & Kuwana (1902 : 459) "We have to do with an abnormal phase of normal straggling!" to explain what they themselves, *at first*, considered to be "..... attributed to mistakes in the collector's records, or to straggling after death when the birds' bodies were in occasional contact in the game bag or on the skinning table."

Thompson (1938 : 184) also pointed out the need for further louse collections from the Galápagos Islands to be studied in conjunction with Kellogg & Kuwana's material. From such material, I have studied all the specimens belonging to the genus *Quadraceps*, but I found that very few were associated with birds which I regard as their natural and regular hosts. The holotype of *Q. obtusus* was among the larger proportion of lice with hosts either erroneous or in need of confirmation, and there was no other *Quadraceps* specimen conspecific with it. The host given on the slide label of that single female (as published by Kellogg & Kuwana, 1902 : 468) is *Sterna fuliginosa* Gmelin, 1788, now considered a junior synonym of *Sterna fuscata* Linnaeus, 1766. This bird, the Sooty Tern, with a circumtropical distribution (see Peters, 1934 : 338–339 and Murphy, 1936 : 1121)* is regularly parasitised by only one species of *Quadraceps*, i.e. *Q. birostris* (see above in ***Material examined***). The holotype of *Q. obtusus* is clearly distinguishable from females of *Q. birostris* by features of the head and abdomen (compare pl. 29, fig. 2 in Kellogg & Kuwana (1902) with pl. 9, fig. b in Timmermann (1957)). Kellogg & Kuwana's material includes 10 further specimens of *Quadraceps* from *Sterna fuscata* collected on Clipperton Island, which they described and named as a new species (*Nirmus gloriosus* K. & K., 1902 : 467) now regarded as a junior synonym of *Q. birostris* (see Hopkins & Clay, 1952 : 311; Linsley & Usinger, 1966 : 131). My examination of those specimens, including the lectotype of *N. gloriosus*, confirms that synonymy. The type series of *N. gloriosus* also includes four males and five females (slides 992a, 1065c,

*Birds which breed on Clipperton Island and on one island of the Galápagos Archipelago (Darwin or Culpepper I.) are regarded as the subspecies *Sterna fuscata crissalis* (Lawrence, 1872) (see Peters, 1934 : 338 and Harris, 1989 : 118).

1072, 1088, 1126a & c, 1133f in CISC) associated with hosts which I regard as erroneous, i.e. resulting from contamination by human agency.

Comparison with other species of *Quadraceps*

The other species of *Quadraceps* collected by the Hopkins Stanford Galápagos Expedition and published by Kellogg & Kuwana (1902) are : *Q. separatus*; *Q. strepsilaris* and *Q. paludicola*. The holotype of *Q. obtusus* is not conspecific with any of those three species. It differs from females of *Q. separatus* in body proportions and details of the head and ventral terminalia. All the specimens of *Q. separatus* examined by Kellogg & Kuwana (1902 : 472), including the lectotype male, are associated with non regular hosts. Even the record of "... a female from *Anous stolidus* from Clipperton Island ..." cannot represent a correct host-louse association because the species of *Anous* breeding on Clipperton I. is *A. minutus* Boie, 1844, not *A. stolidus* (see Peters, 1934 : 346–348). I have not been able to locate that female, but in Kellogg & Kuwana's material there are two males and two females labelled "*Nirmus gloriosus* K. & K. from *Anous stolidus*, Clipperton Id." (slide 1054d in CISC) and two females labelled "*Nirmus gloriosus* K. & K. from *Anous*, Clipperton Id." (slide 1103d/1 in CISC). I have identified them as *Quadraceps hopkinsi hopkinsi* Timmermann, 1952, the species of *Quadraceps* regularly found on *Anous minutus* (see *Material examined*). This bird species is not recorded in Snodgrass & Heller's (1904) paper on the birds of the Hopkins Stanford Galápagos Expedition. Ferris (1932 : 69) realised that the type series of *N. gloriosus* included specimens of a second species, but he identified the latter as *Degeeriella separata* (= *Q. separatus*) unaware of the fact that they represented an undescribed species from an unrecorded host.

The holotype of *Q. obtusus* is very different from females of *Q. strepsilaris*, especially in the shape of the head, pterothorax and abdomen, as well as in the shape and sclerotisation of the abdominal tergites, sternites and lateral thickenings. Kellogg & Kuwana's material includes three specimens of *Q. strepsilaris* from three different hosts (slides 1014c, ♂; 1022c, ♀; 1097c, ♂; in CISC) which they described as a new species, *Nirmus lepidus*, now a junior synonym of *Q. strepsilaris* (Linsley & Usinger, 1966 : 132). Unfortunately none of those three lice are associated with the regular host of *Q. strepsilaris* which is *Arenaria interpres* (see *Material examined* above). Two of the three hosts listed in Kellogg & Kuwana (1902 : 473) for *N. lepidus* belong to the Passeriformes, a large order of birds which are not regular hosts to any species of *Quadraceps*. The third host is *Sterna fuscata crissalis* from Clipperton Island. Hopkins & Clay (1952 : 312) dismissed the passeriform hosts as outright errors, but listed the Sooty Tern as "probably error". The evidence given above shows that *Sterna fuscata* cannot be regarded as a regular host of *Q. strepsilaris* either. Kellogg & Kuwana (1902 : 489) included *Arenaria interpres* in their list of hosts but, ironically, none of its regular lice were listed. Instead they recorded (p.482) one male of "*Eurymetopus brevis* Dufour" from Narborough Island (= Fernandina I., Galápagos Is). I have examined that male louse and have identified it as *Docophoroides levequei* Timmermann, 1963, a regular parasite of *Diomedea irrorata* Salvin, 1883, the Waved or Galápagos Albatross.

Carriker (1957) published an account of the type specimens he was able to locate in the Kellogg collection of lice, then kept in the Natural History Museum of Stanford University. Carriker listed "*Nirmus obtusus*" which he, too, placed in *Quadraceps*, referring to the single female type on slide 1097d. Although in the text he did not mention any further specimen of *Q. obtusus*, he included a drawing of a male genitalia (fig. 47 R) which he labelled as "*Nirmus obtusus*". In the material available I have not found any male labelled as such or as *Quadraceps obtusus*. However, Carriker's drawing can be readily identified as the male genitalia of *Q. strepsilaris*. It is possible that Carriker misidentified the male *Q. strepsilaris* on slide 1097c (see above) as *Q. obtusus* because the host and locality data of both that male and the holotype of *Q. obtusus* are identical, even though Kellogg & Kuwana's identifications are, correctly, different.

A comparison of the holotype of *Q. obtusus* with the single female (the holotype) of *Q.*

paludicola shows that they are strikingly different in so many features that I consider it unnecessary to mention them in detail (see Kellogg & Kuwana's pl. 29, figs 2 & 3). The type host of *Q. paludicola* is *Butorides sundevalli* (Reichenow, 1877), a common coastal heron (family Ardeidae) endemic to the Galápagos Islands (Harris, 1989 : 82). However, no species of the Ardeidae has ever been recorded as a regular host for any *Quadraceps* species, and the features of *Q. paludicola* indicate that it belongs among the *Quadraceps* species regularly found on gulls (family Laridae), a complex group of lice where Kellogg & Kuwana (1902 : 469) had already placed it. Notwithstanding the present uncertain status of *Q. paludicola*, it is clear that the original natural host for the holotype of *Q. obtusus* is not a member of the Laridae.

Among the hosts listed by Kellogg & Kuwana (1902 : 489–491) "*Actitis macularia*" (= *Tringa macularia* Linnaeus, 1766) is the only species known to be a regular host of *Quadraceps* lice which remains to be discussed here. The species regularly found on *T. macularia* is *Q. ravus* (Kellogg, 1899) (see Hopkins & Timmermann, 1954 : 145). However, the holotype of *Q. obtusus* is not conspecific with females of *Q. ravus*, which can be easily distinguished by features of the head (compare Kellogg & Kuwana (1902) pl. 29, fig. 2 with Kellogg (1899) pl. 2, fig. 1).

The regular natural hosts of *Q. obtusus*

I therefore conclude that the original natural host of *Q. obtusus* is a bird species not recorded by Kellogg & Kuwana (1902). The avifauna of Clipperton and the Galápagos Islands includes about 20 further bird species of the order Charadriiformes (see Harris, 1989 : 90–110) known to be regularly parasitised by *Quadraceps* lice. After comparing the holotype of *Q. obtusus* with female specimens and/or descriptions of all the *Quadraceps* species known from those birds, I found that the holotype is identical to females from *Tringa incana* which, at present, are known as *Q. conformis* (Blagoveshtchensky, 1940), type host *Tringa totanus*. Females from the latter are somewhat darker than those from *T. incana*, but males from the two hosts are essentially identical, especially in their very characteristic genitalia. Hopkins & Timmermann (1954 : 144) examined a large number of specimens from *T. totanus*, and gave a good description of *Q. conformis* including photographs of both sexes. However, they had only a single female from *T. incana* which they failed to recognise as *Q. conformis*, identifying it together with four specimens from *Tringa brevipes* (Vieillot, 1816) as their new species *Q. impar* Hopkins & Timmermann, 1954 : 147. Perhaps they were misled by the slight difference in the pigmentation of female lice from *T. totanus* and *T. incana*, and by the close relationship between the hosts *T. brevipes* and *T. incana* (see Vaurie, 1965 : 416). However, female *Quadraceps* from the latter hosts are clearly different in head shape, and the males associated with them are very different in several features.

Timmermann (1957 : 64) was the first to mention *T. incana* as a host of *Q. conformis* but, in view of the earlier record of *Q. impar* on that host, he wrote that the finding on *T. incana* needed confirmation and suggested that it was possibly the result of straggling. He also cited *Tringa guttifer* (Nordmann, 1835) as host of *Q. conformis*, but he did not refer to any locality or specimens. In the absence of any material or further reference to *Q. conformis* from *T. guttifer*, I consider that this host-louse association needs to be confirmed. The association between *T. incana* and *Q. conformis* was subsequently confirmed by the records of Emerson & Petersen (1968 : 340) in the Bismarck Islands, and of Timmermann (1971 : 41) in Japan.

Although *Q. conformis* (now = *Q. obtusus*) is known from two (possibly three) hosts, their geographical distribution (see Vaurie, 1965) as well as the lighter pigmentation of the holotype of *Q. obtusus* clearly indicate that *Tringa incana* was the original natural host of the latter. Clipperton and the Galápagos Islands are situated well within the wintering areas of *T. incana*. Harris (1989 : 99) qualifies this wader as a "Very common migrant shorebird, outnumbering all the other waders in the [Galápagos] islands".

The original natural host of the holotype

It follows from the foregoing that at least one specimen of *T. incana* must have been collected

and/or deloused during the Hopkins Stanford Galápagos Expedition to explain the origin of the *Q. obtusus* holotype. In the bird paper from that Expedition, Snodgrass & Heller (1904 : 259) list *T. incana* (as *Heteractitis incanus*) as "A frequent winter visitor at the Galapagos where it has been reported from nearly all of the islands." but they do not mention any specimen taken dead or alive. However, the bird collection of the California Academy of Sciences (San Francisco, U.S.A.) contains the preserved skin of a male *T. incana* (labelled as *Heteroscelus incanus*), no. 74235, collected on Guadalupe Island [29°15'N – 118°50'W], by R.E. Snodgrass and E. Heller during the Hopkins Stanford Galápagos Expedition on 5 November 1898. Another instance of lice from Guadalupe I. collected by that Expedition from a bird not recorded in Snodgrass & Heller (1904) is discussed by Ward (1953). This relates to the identity of another species described by Kellogg & Kuwana (1902) from several erroneous hosts, including *Sterna fuscata* from Clipperton Island. After reading Snodgrass & Heller's report, Ward (1953 : 202) expressed doubt regarding the status of the host data attached to the lice he examined, to the point of denying his earlier assumption that "... Snodgrass and Heller actually did collect this host but did not record it in their paper". Considering the evidence presented here, I am convinced that Snodgrass & Heller's (1904) bird paper, although clearly entitled "Papers from the Hopkins-Stanford Galápagos Expedition, 1898–1899", listed and recorded specimens belonging to species from the Galápagos Islands *only*, i.e. they purposely excluded specimens taken from the other islands visited by that Expedition. Otherwise, what explanation could be given to the apparent contradiction between Snodgrass & Heller's (1904 : 239) statement under '*Sterna fuliginosa*' that "We observed it at these islands [Wenman, and Culpepper; Galápagos Is] in December, but did not secure any specimens" and the fact that Kellogg & Kuwana's (1902) material includes 11 species of lice from that tern from Clipperton Island, even if only two of them are correct in their host association.

Instead of the "abnormal phase of normal straggling" alleged by Kellogg & Kuwana (1902: 459) to explain the unusual host-lice associations they encountered, I propose an abnormal level of human error and/or ignorance when dealing with freshly killed hosts. My own experience in louse collecting from live birds in the Galápagos Islands indicates that the level of natural straggling – i.e. exchange of lice between hosts of different species without human intervention – among the birds living on those islands is extremely low, and by no means different from that recorded in other island groups, e.g. the Snares Islands (see Horning, Palma & Pilgrim, 1980).

The itinerary of the Hopkins Stanford Galápagos Expedition, published by Heller (1903), together with the evidence from the material which I have studied strongly suggest that the birds collected on Guadalupe Island on 5 November 1898, the first island visited by the Expedition, those killed on Clipperton Island on 22 November, and subsequent specimens taken at the Galápagos Islands from 10 December onwards, were all at some stage in direct physical contact or were placed in the same containers at different times. In such a highly probable scenario, the lice from any bird species could have been artificially transferred to any other unrelated host species. The host-louse associations published by Kellogg & Kuwana (1902) fit that scenario to perfection!

CONCLUSIONS

In summary, I have reached the following conclusions:

1. The type host of *Quadraceps obtusus* (Kellogg & Kuwana, 1902), i.e. *Sterna fuscata crissalis*, is not its regular natural host.
2. The association between the holotype of *Q. obtusus* and its type host is due to contamination by human agency.
3. The original natural host for the holotype of *Q. obtusus* is not listed or mentioned in Kellogg & Kuwana (1902).
4. Two regular natural hosts of *Q. obtusus* are *Tringa incana* and *T. totanus* (*T. guttifer* needs confirmation).

5. The original natural host of the holotype of *Q. obtusus* may have been the male specimen of *Tringa incana* now preserved in the California Academy of Sciences (skin No. 74235).
6. *Q. obtusus* is a senior synonym to *Q. conformis* (Blagoveshtchensky, 1940).
7. The drawing of the male genitalia published by Carriker (1957, fig. 47 R) as of *Q. obtusus* is actually of *Q. strepsilaris*.
8. *Quadraceps hopkinsi hopkinsi* Timmermann, 1952 is first recorded from Kellogg & Kuwana's material, and its original natural host is inferred to be *Anous minutus* from Clipperton Island.
9. None of the specimens of *Q. separatus*, *Q. strepsilaris* and *Q. paludicola* in Kellogg & Kuwana's material are associated with their regular hosts.
10. The high proportion of unusual host-louse associations recorded by Kellogg & Kuwana (1902) is due to contamination by human agency, and *not* to natural causes as concluded by those authors (see also Hopkins, 1951).

ANNOTATED SYNONYMY

[Annotations are included in square brackets]

***Quadraceps obtusus* (Kellogg & Kuwana, 1902)**

Nirmus obtusus Kellogg & Kuwana, 1902 : 468, pl. XXIX fig. 2 (Type host : *Sterna fuliginosa* = *Sterna fuscata crissalis* (Lawrence, 1872). In error). Holotype ♀ on slide 1097d in CISC [Description based on a single female from Clipperton Island].

Nirmus obtusus; Kellogg, 1908 : 27 [Listed only, and erroneously ascribed to the Galápagos Islands only].

Degeeriella obtusa (Kellogg & Kuwana, 1902); Harrison 1916 : 119 [Listed only].

"*Degeeriella furva* (Nitzsch)" Fresca, 1925 : 286, fig. 7 (not *Nirmus furvus* Burmeister, 1838) [Description of male genitalia only. No host given].

Degeeriella obtusa; Waterston, 1928 : 82 [Listed only; under '*Sterna fuliginosa*'].

Degeeriella obtusa; Thompson, 1939 : 120 [Listed only, and erroneously ascribed to the Galápagos Islands, in addition to Clipperton Island].

Degeeriella conformis Blagoveshtchensky, 1940 : 56, 84, fig. 14 (Type host : *Tringa totanus* (Linnaeus, 1758)) [Description based on both sexes, but only the female figured. From Azerbaijan. **New synonymy**].

Quadraceps obtusus (Kellogg & Kuwana, 1902); Eichler, 1946 : 51 [Listed only].

Degeeriella conformis; Blagoveshtchensky, 1948 : 285, fig. 19 [Figure of male genitalia. Record from type host].

Quadraceps conformis (Blagoveshtchensky, 1940); Thompson, 1948 : 350 [Listed only; under type host].

Degeeriella obtusa; Thompson, 1948 : 364 [Listed only; under *Sterna fuscata crissalis*].

Degeeriella conformis; Blagoveshtchensky, 1951 : 300 [Record from type host in Tajikistan].

Quadraceps conformis; Hopkins & Clay, 1952 : 310 [Listed only].

Quadraceps obtusus; Hopkins & Clay, 1952 : 314 [Listed only. Type host regarded as probably erroneous].

Quadraceps conformis; Balát, 1953 : 175 [Record from type host in Czechoslovakia].

Quadraceps conformis; Hopkins & Timmermann, 1954 : 144, text-fig. 10, pl. II figs 13 & 14 [Redescription of both sexes based on many specimens from type host and other subspecies of *Tringa totanus* in several localities. Includes drawing of male genitalia, and photographs of both sexes].

"*Quadraceps impar*" Hopkins & Timmermann, 1954 : 147 [misidentification of one female from *Tringa incana* from California].

Quadraceps obtusus; Carriker, 1957 : 101 [Lists and gives data associated with the single female type. His fig. 47 R of male genitalia is *not* of *Q. obtusus*].

Quadraceps conformis; Timmermann, 1957 : 63, fig. 35.6 [*Tringa guttifer* and *Tringa incana*

are mentioned as hosts of *Q. conformis*. Neither record is supported by a locality or specimens. That from *T. incana* is regarded as a possible case of straggling, and in need of confirmation].

Quadraceps conformis; Balát, 1957 : 455 [Record from type host in west Hungary].

Quadraceps conformis; Negru, 1959 : 141 [Record from type host in Romania].

Quadraceps conformis; Brelih & Tovornik, 1962 : 96 [Record from type host in Slovenia].

Quadraceps conformis; Złotorzycka, 1967 : 713, pl. IV fig 4 [Listed, including synonymy and photograph of male abdominal terminalia and genitalia].

Quadraceps obtusus; Złotorzycka, 1967 : 727 [Listed as a species of uncertain taxonomic position].

Koeniginirmus (*Koeniginirmus*) *obtusus* (Kellogg & Kuwana, 1902); Złotorzycka, 1967 : 774 [Listed under *Sterna fuscata* in host-parasite list, but in different genus from citation on page 727].

Quadraceps conformis; Emerson & Petersen, 1968 : 340 [Record from *Tringa incana* in the Bismarck Islands].

Quadraceps conformis; Timmermann, 1971 : 41 [Record from *Tringa incana* in Japan].

"*Quadraceps birostris*" Emerson, 1972 : 136 (not *Nirmus birostris* Giebel, 1874) [Unjustified and erroneous synonymy].

Quadraceps conformis; Emerson, 1972 : 137 [On *Tringa incana* in North America. Listed only].

"*Quadraceps strepsilaris*" Emerson, 1972 : 146 (not *Nirmus strepsilaris* Denny, 1842) [Unjustified and erroneous synonymy].

Quadraceps conformis; Cabot, 1975 : 146 [Record from type host in Ireland].

Quadraceps conformis; Rékási, 1978 : 150 [Record from type host in east Hungary].

Quadraceps conformis; Rékási & Kiss, 1980 : 75, 89 [Record from type host in delta of Danube river].

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