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A review of the Xoloptoidinae (Acari, Pterolichidae) and the description of a new genus

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(With 14 figures)

Abstract

Pelargodacna heteromorpha gen. n., sp. n. (Pterolichidae, Xoloptoidinae) is described from a stork, **Ciconia nigra** (L.), China. Additional specimens from **Ciconia ciconia** (L.), Morocco may be accidental. The taxa of the Xoloptoidinae are reviewed, new records added, and an identification key to the genera provided.

Introduction

The Ciconiiformes are hosts of numerous feather mite taxa, many of which are restricted to certain ciconiiform families. Examples from the Pterolichidae are the Ardeacarinae Gaud and Ardealginae Gaud from the Ardeidae (herons), the Xoloptoidinae Gaud from the Ciconiidae (storks), and a few genera of the Pterolichinae from various families. Herein, we will briefly review the known taxa of the Xoloptoidinae, add new host records, present a key to the genera assigned to the subfamily and describe **Pelargodacna heteromorpha** gen. n., sp. n.

Methods and nomenclature

Signatures for the idiosomal chaetotaxy follow Griffiths et al. (1990). Measurements, in micrometers (µm), are given as the mean ± standard error (when N > 10) followed by the number of observations and observed limits in parentheses. Stork systematics for the family Ciconiidae follow Kahl (1979).

Measurements for the gnathosomal and idiosomal widths are subject to considerable distortion in microslide preparations. Widths of these structures given in the descriptions are probably near the stated lower limits. Measurements of leg segments are taken from the dorsal surfaces; these are best obtained with the segments in lateral aspect.

Abbreviations for accession numbers are NMNH for bird specimens from which mite collections were taken at the U.S. National Museum of Natural History, and UGA for mite collections accessed into the University of Georgia.

Family Pterolichidae, Subfamily Xoloptoidinae Gaud

Gaud (1982) defined the subfamily on the basis of **Taeniosikya** Gaud with 2 species, and 3 monotypical genera, **Xoloptoides** Gaud & Mouchet, **Pelargolichus** Gaud and an unnamed taxon (= **Pelargodacna heteromorpha** described herein). He believed the most important character state to differentiate these genera from other Pterolichidae is the placement of the genital discs anterior to the genital setae in females. An easier character state to observe is the deep and wide tegumental striations between the prodorsal and hysterosomal shields in adults (figs 1, 2, 7, 11); however, among immatures this condition is not unique (e.g., **Rhytidelasma** Gaud, Pterolichidae, Pterolichinae). Other distinguishing features are bi- or trifid setae d1 of the palps; the wide separation of solenidia 1 and setae ba on tarsus II; the subapical placement of all setae distal to ba on tarsi I and II; epimerites I V- or Y-shaped; and the ovoid and edentate ambulacra.

In males, coxal fields IV are closed, setae 3a and 3b are in a transverse row, legs IV are wider than legs III, and tarsus IV terminates in a large dorsal claw. In females, the spermpore can be on the idiosomal terminus or at the end of an external spermduct.

Character state comparisons among the Xoloptoidinae genera are given in Table 1.

Table 1. Comparisons of character states among 1, **Pelargodacna** gen. n., 2, **Pelargolichus**, 3, **Xoloptoides** and 4, **Taeniosikya**.

	1	2	3	4
BOTH SEXES				
Setae c1 on shield	no	no	no	yes
Setae cGI	setiform	setiform	acuminate	setiform
MALES				
Heteromorphy	yes	no	no	no
Setae vi	lanceolate	simple	simple	simple
Ambulacra IV	present	present	absent	present
Setae f2	absent?	present	present	present
Setae h3 expanded	yes	no	no	yes
FEMALES				
External spermduct	no	yes	no	yes
Setae h3:h2	equal	equal	equal	h3<<h2

Key to the genera of the Xoloptoidinae

1. Male with adanal discs circular. Female with setae h2, h3 usually long, subequal 2

- Female with setae h3 short and fine. Male with adanal disc membranes, in form of longitudinally elongated bands (or ribbons) with minute adanal discs at apices of bands . . . . . **Taeniosikya** Gaud

2. Setae si closer to setae se than to meson; genu I with seta cG not forked 3

- Setae si equidistant between setae se and meson (except heteromorphic male); genu I with seta cG dilated, forked . . . . . **Pelargodacna** gen. n.

3. Female with external spermduct. Male legs IV with ambulacra . . . . . **Pelargolichus** Gaud

- Female without external spermduct. Male legs IV without ambulacra . . . . . **Xoloptoides** Gaud & Mouchet

Genus **Xoloptoides** Gaud & Mouchet

Xoloptoides Gaud & Mouchet, 1959: 664.

Type species: **Xoloptoides colpocestus** Gaud & Mouchet (by original designition).

Xoloptoides colpocestus Gaud & Mouchet

Xoloptoides colpocestus Gaud & Mouchet, 1959: 665-667; Gaud & Till, 1961: 299; Gaud, 1982: 350.

Described from **Ciconia episcopus** (Boddaert) (= **Dissoura episcopus**) from the southern Cameroons (Gaud & Mouchet 1959), this species was later reported from the same host in Ethiopia and Zaire (Gaud 1982). We have collections of this species from the type host: 1 from Cameroon, 1 from Ethiopia, 1 from Zaire and 1 from Morocco.

Genus **Pelargolichus** Gaud

Pelargolichus Gaud, 1982: 346-347.

Type species: **Xoloptes didactylus** Trouessart (by original designation).

Pelargolichus didactylus (Trouessart)

Xoloptes didactylus Trouessart, 1885: 113.

Pelargolichus didactylus: Gaud, 1982: 347 (includes synonymy).

This species was originally described from **Ciconia ciconia** (L.) from Europe, and subsequently was found on the same species in Eurasia (Dubinin 1956), Mozambique (Gaud & Till 1961) and Zaire (Gaud 1982); we have 2 collections from the host species from Mozambique and 1 collection each from France and Morocco.

A small collection (2 males, 1 female) from **Ciconia ciconia boyciana** Swinhoe from Korea represents a new species.

Genus **Taeniosikya** Gaud

Taeniosikya Gaud, 1961: 87-89.

Type species: **Taeniosikya anclophylla** Gaud (by original designation).

Taeniosikya specimens are rarely plentiful from museum study skins, the usual collection consists of a few females and nymphs. Intensive collecting needs to be done so this genus could be revised. Species are known to occur on taxa of the tribes Mycteriini and Leptoptilini as we have collections from both species of **Ephippiorhynchus** Bonaparte, 2 of 3 species of **Leptoptilos** Lesson, 3 of 4 species of **Mycteria** L., and 1 of 2 species of **Anastomus** Bonnaterre. We have nothing from **Jabiru mycteria** (Lichtenstein). In addition to the two named species, we have 6 new species, each associated with a different host.

With the accumulated host - commensal associations, we know that **Taeniosikya** is the only genus of the Xoloptoidinae with species in both hemispheres.

Taeniosikya ancylophylla Gaud

Taeniosikya ancylophylla Gaud, 1961: 87-89; Gaud, 1982: 347.

This species was described from **Mycteria ibis** (L.) (= **Ibis ibis**) from the Cameroons and subsequently taken from the same host in Zimbabwe (Gaud 1982). We have additional material in 2 collections from the same host from Nigeria.

Taeniosikya crumeniferi Gaud

Taeniosikya crumeniferi Gaud, 1982: 347-350.

Gaud described this species from 2 males and 1 female taken from **Leptoptilos crumeniferus** (Lesson), Cameroon. We have 1 female from Nigeria from the type host.

Pelargodacna gen. n.

TYPE SPECIES: **Pelargodacna heteromorpha** sp. n.

DESCRIPTION. Xoloptoidine mites with polymorphic males; setae cG of genu I forked.

MALE. Setae vi lanceolate; setae g, genital discs, genital organ between mesal extensions of epimerites 3A; coxal fields IV closed; setae ps3 between trochanters IV, distant from adanal discs; setae h2, h3 with unilateral expansions; terminus with small cleft; lobes without postlobar membranes; gnathosomata, propodosomata, setae si, anterior legs largest in heteromorph.

FEMALE. Setae vi long, expanded slightly; opisthosomal terminus rounded; external spermduct absent, spermpore terminal.

ETYMOLOGY. From pelargos (Gr., stork) and dakno (Gr., bite); feminine.

DIAGNOSIS. **Pelargodacna** is superficially similar to other Xoloptoidinae, but the males are polymorphic and have the internal vertical setae lanceolate. Females are very similar to **Xoloptoides** in that both lack an external spermduct. The spermpore of **Pelargodacna** females is posterior to setae ps1, anterior to these setae in **Xoloptoides.**

REMARKS. **Xoloptoides** males have 2 size classes. To test for heteromorphy in this and other xoloptoidine genera, the ratio of hysterosomal length to femur I length (in lateral aspect) was used. For the heteromorphic male of **Pelargodacna** this ratio was 2.5:1; in the homeomorphic male and males of other genera, about 5:1; and for all females, about 4.5:1. Between these ratios and other characters, it is concluded that only **Pelargodacna** has polymorphic males.

Pelargodacna heteromorpha sp. n.
(Figs 1-14)

TYPE DATA. From **Ciconia nigra** (L.) (Ciconiidae): N. China: Shansi Province: Tai-yuan, holotype heteromorphic male, 4 heteromorphic males, 5 homeomorphic males, 7 female paratypes, 1 pharate female, 3 protonymphs, 1 larva, 14 October 1911, E. T. Nystrom (NMNH 223203, UGA 2096). The holotype and paratypes are deposited in the U.S. National Museum of Natural History, Washington. Paratypes are deposited in the Zoologisches Institut und Zoologisches Museum Hamburg, and the institutions of the authors.

ADDITIONAL MATERIAL. From **Ciconia c. ciconia** (L.): Tangier, Morocco, 1 homeomorphic male, 3 females, 2 protonymphs, 5 March 1888, collector unknown (NMNH 148157, UGA 2097).

ETYMOLOGY. The specific epithet refers to the polymorphic males.

DESCRIPTION. Heteromorphic male: Length, including gnathosoma 678 (5, 672-695), width 260 (5, 229-284). Gnathosoma large, chelicerae long, wide; prodorsal shield wide anteriorly, continuous with scapular shields, internal verticals lanceolate, scapulars long; hysterosomal shield continuous with humeral shields, c3 short and thick, h2 and h3 with unilateral flanges; epimerites I Y-shaped; setae 3a, g, 4a, ps3 in linear arrangement; ps3 distant from adanal discs; legs I, II robust; tarsus IV short, with apical

claw, with ambulacral stalk arising apicoventrally. Measurements: gnathosomal length X width 144.3 (5, 135.5-146.2) X 134.5 (3, 132.6-136.5), cheliceral length 190.7 (5, 179.4-195.0), prodorsal shield length 170.4 (5, 165.7-179.4), vi length 132.6 (4, 128.7-140.4), vi:vi 38.4 (5, 36.0-40.9), se:se 138.6 (5, 132.6-144.5), si:si 44.8 (5, 39.0-50.9), si length 234.0 (2), c2 length 70.2 (3, 68.2-72.1), e2:e2 138.2 (5, 130.6-143.3), e2 length 110.1 (4, 107.2-113.1), h3:h3 54.4 (5, 50.7-58.5), cGI 28.3 (4, 27.3-29.2). Leg segments, femur to tarsus, I: 126.2 (4, 124.8-126.7), 79.5 (4, 78.0-81.9), 96.5 (4, 93.6-97.5), 68.6 (4, 68.2-70.2); II: 93.6 (3, 91.6-95.5), 59.1 (3, 58.5-60.4), 58.7 (3, 58.5-59.4), 65.5 (3, 60.4-70.2); III: 40.6 (5, 37.0-44.8), 51.8 (5, 48.7-54.6), 47.2 (5, 42.9-50.7), 63.2 (5, 60.4-66.3); IV: 59.4 (4, 58.8-62.4), 41.9 (4, 40.9-44.8), 38.0 (4, 37.0-39.0), 35.1 (4).

HOMEOMORPHIC MALE. Length, including gnathosoma 537 (6, 529-545), width 210 (6, 198-229). Chelicerae small, anterior margin of prodorsal shield relatively narrow, setae vi lanceolate, setae si short, legs I-IV subequal. Measurements: gnathosomal length X width 83.5 (6, 78.0-87.7) X 72.1 (6, 66.3-78.0), cheliceral length 90.7 (6, 81.9-101.4), prodorsal shield length 105.5 (6, 97.5-107.2), vi length 82.5 (6, 70.2-95.5), vi:vi 25.0 (6, 23.4-27.3), se:se 96.9 (6, 91.6-105.3), si:si 43.5 (6, 39.0-48.7), si length 31.8 (6, 29.2-33.4), c2 length 38.0 (6, 33.1-42.9), e2:e2 116.8 (6, 113.1-121.9), e2 length 90.7 (6, 87.7-93.6), h3:h3 48.0 (6, 44.8-50.7), cGI 19.5 (6, 17.5-23.4). Leg segments, femur to tarsus, I: 60.2 (6, 52.6-65.3), 47.6 (6, 42.9-50.7), 49.3 (6, 44.8-50.7), 44.8 (6, 42.9-46.8); II: 53.6 (6, 48.7-58.5), 39.8 (5, 39.0-42.9), 39.2 (6, 37.0-40.9), 48.9 (6, 44.8-50.7); III: 31.8 (6, 29.2.-35.1), 42.1 (6, 40.9-44.8), 38.6 (6, 37.0-40.9), 52.2 (6, 50.7-53.6); IV: 56.9 (6, 54.6-58.5), 39.2 (6, 39.0-40.9), 34.1 (6, 31.2-37.0), 32.3 (6, 31.2-35.1).

FEMALE. Length, including gnathosoma 649 (9, 613-671), width 282 (9, 262-301). Propodosoma, anterior legs similar to homeomorphic male except vi setiform; epigynum thin, genital discs betweeen epigynum, setae g. Measurements: gnathosoma length X width 103.3±1.5 (10, 98.0-109.7) X 97.4±2.6 (10, 84.3-109.7), cheliceral length 104.6±1.2 (10, 99.9-113.7), prodorsal shield length 139.1±1.7 (10, 129.3-147.0), vi:vi 29.4±0.5 (10, 25.5-31.3), se:se 123.1±1.2 (10, 117.6-129.3), si:si 61.1±1.1 (10, 54.9-64.7), si length 39.2 (9, 35.3-47.0), c2 length 41.6 (9, 45.1-52.9), h3:h3 21.5 (10), cGI 17.4 (9, 15.7-17.6). Legs, femur to tarsus, I: 69.6±0.8 (10, 66.6-74.5), 50.3±0.7 (10, 47.0-54.9), 52.3±0.7 (10, 49.0-56.8), 55.8±0.4 (10, 54.9-58.8); II: 64.3±1.0 (10, 60.7-70.5), 45.7±0.3 (10, 45.0-47.0), 44.3±0.6 (10, 41.6-47.0), 59.4±0.6 (10, 54.9-60.7); III: 32.1±1.0 (10, 29.4-37.2), 48.1±0.4 (10, 46.8-50.7), 43.7±0.7 (10, 41.1-49.0), 61.5±0.7 (10, 58.5-64.7); IV: 38.8±1.2 (10, 33.3-43.1), 54.5±0.4 (10, 50.9-56.8), 47.0±0.4 (10, 45.0-49.0), 83.1±0.8 (10, 78.4-86.2).

REMARKS. Scanning electron micrographs of the ventral gnathosoma have been included to show the structure and ornamentation of the pseudorutellar processes and hypostome (sensu D. E. Johnston, in Atyeo & Braasch 1966). There have been few investigations including the fine detail of these structures so comments on relationships based on the pseudorutellar processes and/or hypostome can not be made.

Immatures have setae cG on genua I forked; the size of the seta increases through the developmental instars. Additionally, the size of the hysterosomal shield increases from larva to adult.

There is a question about the validity of the **Ciconia ciconia** association. When collecting feather mites from museum study skins there is always a possibility of mites from one host being accidentially associated with another host, even when care is taken to clean the work area after host examinations. Bird feathers act as dust mops, especially when the relative humidity is low and static electricty is high. In the sequence of host examinations, we worked with **Ciconia nigra** (UGA 2096) and then **Ciconia ciconia** (UGA 2097). We suspect that mites from the first host were "picked-up" by **C. ciconia** feathers in the work area, and then were dislodged when **C. ciconia** was examined.

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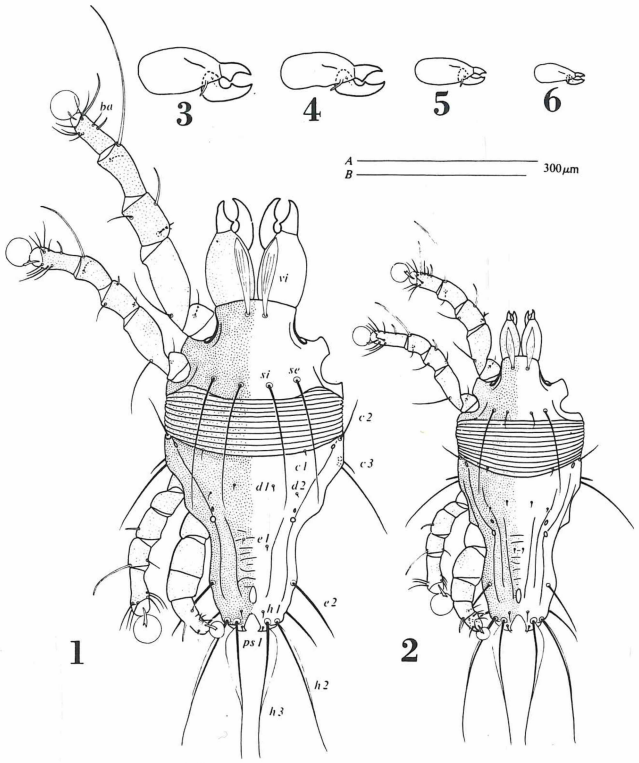
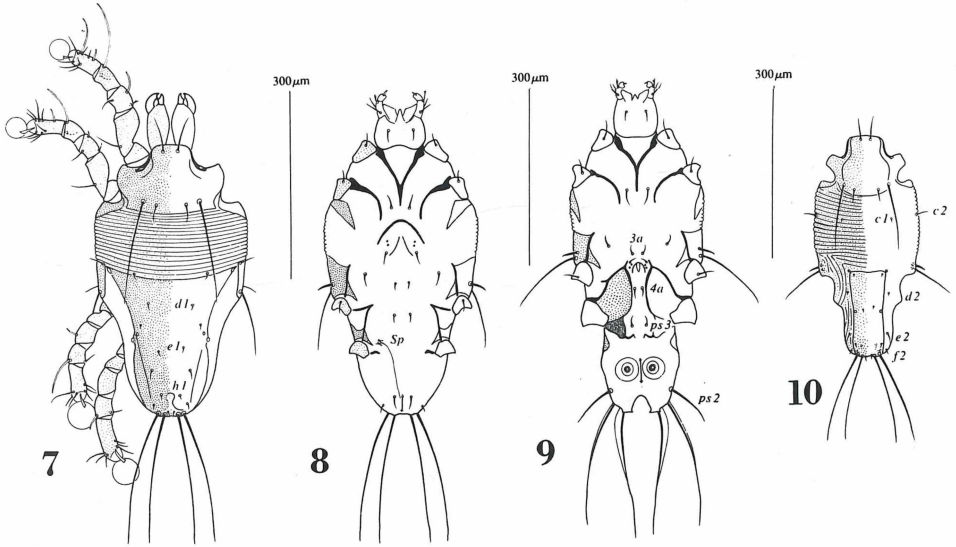
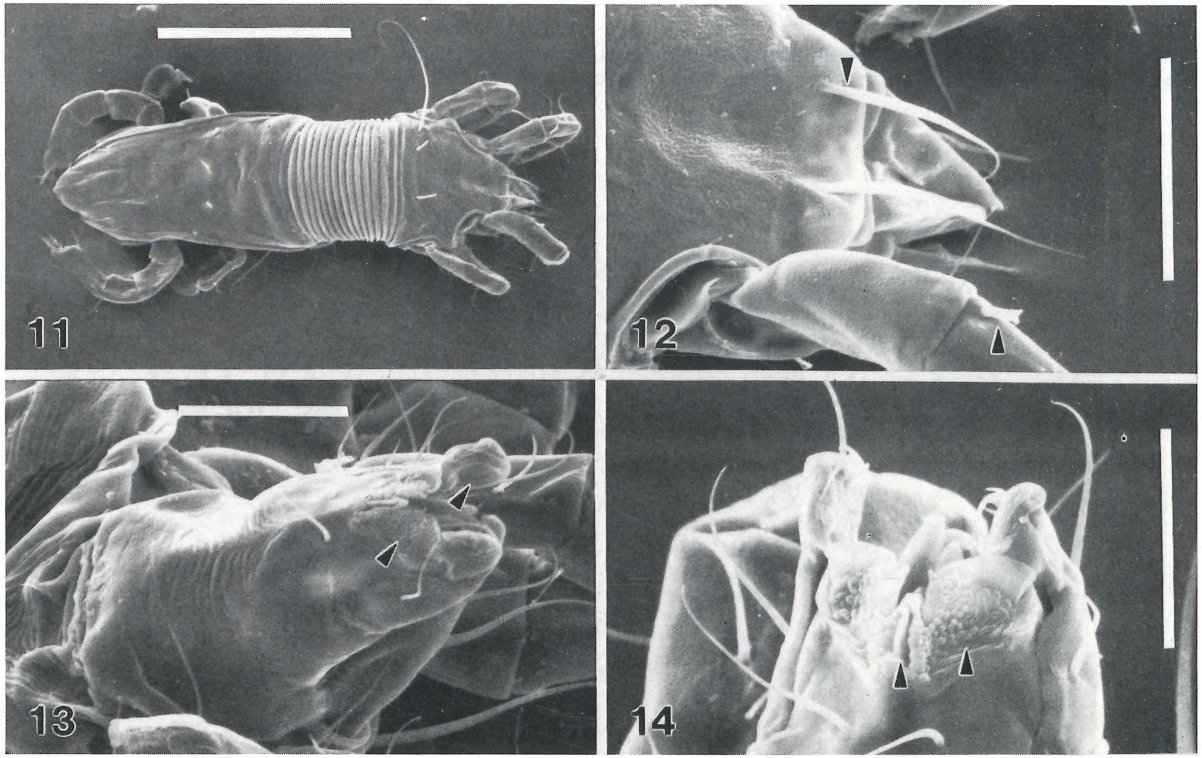


Figs 1-6: **Pelargodacna heteromorpha** sp. n.: 1, dorsal aspect of heteromorphic male; 2, dorsal aspect of homeomorphic male; 3-6, lateral aspects of chelicerae; 3, 4, heteromorphic males; 5, female; 6, homeomorphic male. Scale A, figs 3-6; scale B, figs 1-2. Setal signatures follow Griffiths et al. (1990).



Figs 7-10: **Pelargodacna heteromorpha** sp. n.: 7, 8, dorsal and ventral aspects of female; 9, ventral idiosoma of homeomorphic male, 10, dorsal idiosoma of protonymph. Setal signatures follow Griffiths et al. (1990).



Figs 11-14: **Pelargodacna heteromorpha** sp. n., SEM micrographs of female: 11, dorsal aspect showing area of broad striations; 12, anterior idiosoma, left arrow = seta vi, right arrow - seta cG of genu I; 13, oblique angle of ventral gnathosoma, bottom arrow = pseudorutellar process, top arrow = apical podomere of palpus; 14, ventral apex of gnathosoma, right arrow = hypostome, right arrow = pseudorutellar process. Scales: 11, 200 µm; 12, 14, 50 µm; 13, 20 µm.

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