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SPECIES OF *AGAON* DALMAN AND *ALLOTRIOZOON* GRANDI FROM AFRICA AND MALAGASY (HYMENOPTERA CHALCIDOIDEA, AGAONIDAE)

by

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With 59 text-figures

Since the publication of my catalogue of *Agaon* Dalman (Wiebes, 1968) and the key to its species (Wiebes, 1969), several new samples were collected, both in West and East Africa and in Malagasy. In the present paper five new species are described, and keys are given to the species of the two groups recognized in 1969. For bibliographical data reference is here made to the papers mentioned above.

The genus *Allotriozoon* Grandi, not revised since its original description by Grandi (1916), is treated in more detail than is *Agaon*. One name is synonymized, and one new species is added to those already known for more than fifty years; the knowledge of their distribution is considerably enlarged.

Acknowledgements are due to those who collected the samples and sent them for inclusion in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden (abbreviated RMNH in the text), viz., L. H. M. Blommers (Amsterdam, formerly at ORSTOM, Malagasy), Dr. D. S. Hill (Hong Kong, formerly at Makerere University, Uganda), Dr. J. T. Medler (Ile-Ife, Nigeria), Dr. L. E. Newton (Kumasi, Ghana), Drs. E. S. Ross and R. E. Leech (California Academy of Sciences, San Francisco, to where the material will be returned), and Dr. & Mrs. W. W. J. O. de Wilde-Duijfjes (Leiden, The Netherlands). Of the samples donated by Dr. Hill, more specimens are preserved in his private collection.

Agaon Dalman, 1818

Species-group of *Agaon paradoxum* Dalman

Key to species (females [1])

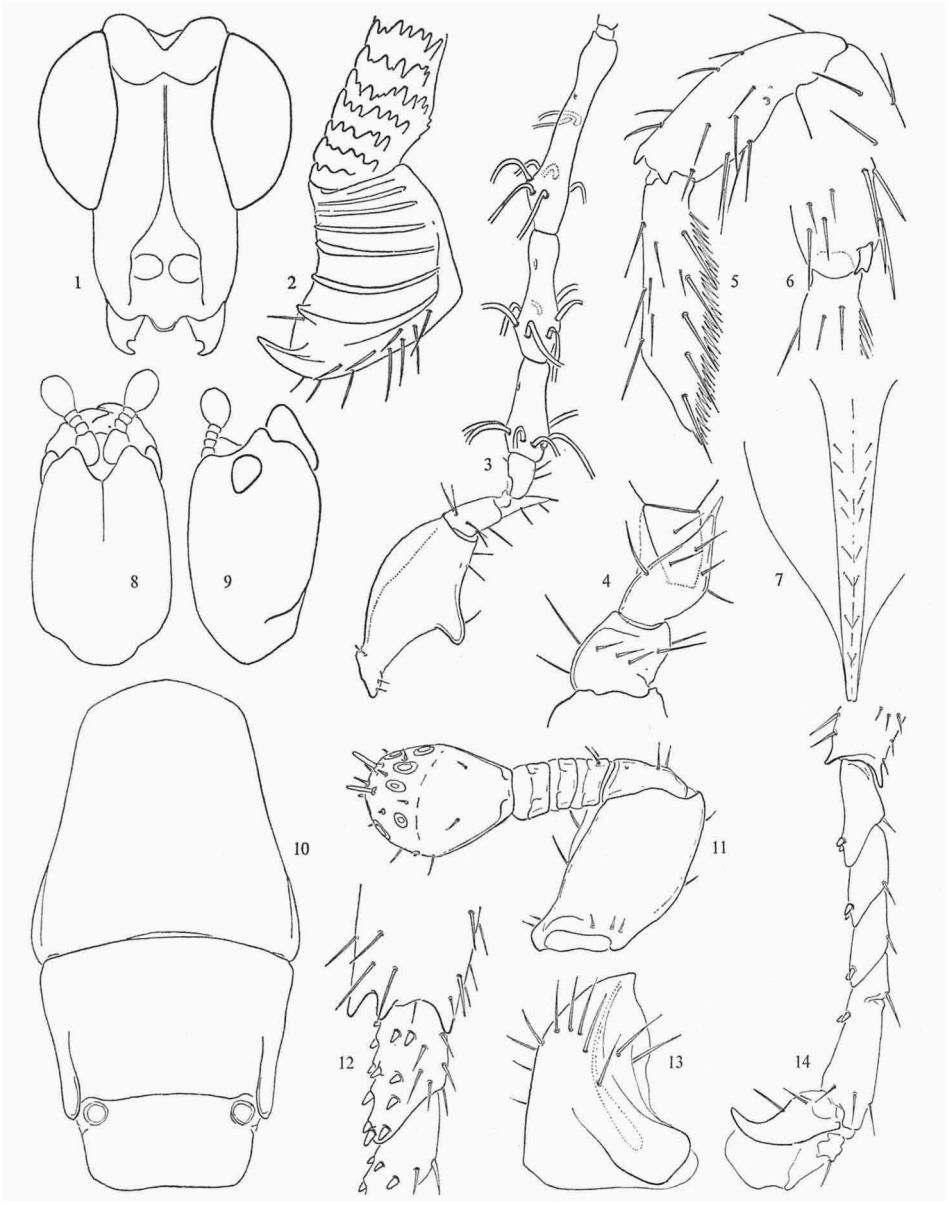
1. Eyes large and bulging, their longitudinal diameter twice as long as the cheek. Process of the third antennal segment, although reaching beyond the apex of the fourth segment, rather slender. Appendage of the mandible bearing approximately thirty transverse rows of about seven fine crenulations . . . . *A. kiellandi*
— Eyes much smaller, even if slightly bulging; their longitudinal diameter shorter than the cheek. The number of crenulations on the mandibular appendage is at least twice as large, and there are over forty transverse rows **2**
2. Process of the third antennal segment very long and wide, spatulate, reaching far beyond the apex of the fourth segment . . . . . *A. spatulatum*
— Process of the third antennal segment much shorter, at most reaching the apical edge of the fourth segment 3
3. Longitudinal diameter of the eye rather variable, in most instances more than half as long as the cheek. Clypeal part of the face with an oblong patch of setae. Process of the third antennal segment wide, just reaching the apex of the fourth segment. Colour yellow-brown . . . . . *A. paradoxum*
— Longitudinal diameter of the eye shorter, about half as long as the cheek. Clypeal part of the face with a few long setae. Process of the third antennal segment tapering to a point, much shorter than the fourth segment. Colour distinctly darker, brown . . . . . *A. baliolum*

Agaon kiellandi spec. nov. (figs. 1-14)

Material. — 45 ♀ 8 ♂, Tanganyika, Mpanda, Mt. Sibeti, 2000 m alt., 2.v.1970, leg. J. Kielland, ex *Ficus* spec. (riverine strangler fig) (RMNH 2216, ♀ holotype and ♀ ♂ paratypes slide-mounted).

Description. — Female. Head (fig. 1) longer than wide across the compound eyes (5 : 4); the eyes bulging and very large, their longitudinal diameter twice as long as the cheek; no ocelli. Antenna (fig. 3) consisting of eleven free segments: the scape short and robust, with a distinct ventral prominence; the pedicel in one line with the sharp third segment (fig. 4); the fourth approximately as long as the pedicel; the fifth, sixth and seventh progressively longer (the seventh to eleventh subequal in length), bearing about seven very long sensilla in one basal row (fifth and sixth segments) to many more sensilla in two rows (seventh to eleventh; the apical row very incomplete in the seventh, more complete in the eleventh); the apical wider than the proximal, which gives the antenna a clubbed appearance. Trophi long; the labium and maxillae each with two (sub-)apical setae, the mandible (fig. 2) with one sharp apical tooth and seven ventral ridges, the appendage

1) The males of *A. spatulatum* and *baliolum* are not known. For differentiation of *A. paradoxum* and *kiellandi*, see in the description of *A. kiellandi*.



Figs. 1-14. *Agaon kiellandi* spec. nov. 1-7, female holotype; 8-14, male. 1, head, outline; 2, mandible and part of appendage; 3, proximal segments of antenna, axial and partly ventral aspect; 4, do., detail in antiaxial view; 5, fore tibia and tarsus, antiaxial aspect; 6, apex of hind tibia, antiaxial aspect; 7, hypopygium; 8, head, outline of dorsal aspect; 9, do., lateral aspect; 10, thorax, outline; 11, left antenna, antiaxial aspect; 12, apex of hind tibia, and metatarsus, antiaxial aspect; 13, mandible, ventral aspect; 14, apex of mid tibia, and tarsus, antiaxial aspect. Figs. 1, 7-10, ×65; 2, 4-6, 11-14, ×210; 3, ×105.

long and narrow (10 : 1), with approximately thirty rows of about seven fine crenulations.

Thorax with sternal and coxal pollen pockets. Pronotum very short, scarcely visible from above, longer laterad. Fore wing (5 : 2), 3 mm long; the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 6 : 2 : 1 : 4; the membrane with spurious veins and dense microtrichiae. Hind wing (5 : 1), 1.4 mm long. Legs very long and slender. Fore femur as long as coxa and trochanter combined; the tibia (fig. 5) one-third of this length, with two apical teeth; the metatarsus as long as the tibia, the tarsal segments in ratio 8 : 6 : 4 : 3 : 4, with long ventral spines and a plantar fringe. Mid leg: femur, tibia, and tarsus subequal in length; the tarsal segments approximately in ratio 5 : 3 : 3 : 2 : 3. Hind leg more robust; the coxa half as wide as long, two-thirds the length of the femur; the tibia as long as the femur, with a very small ventral spur (fig. 6); the tarsal segments in ratio 7 : 5 : 4 : 3 : 3, with ventral spines and a plantar fringe.

Gaster. Hypopygium (fig. 7) simple; the pygostyle rather angular in outline, with four setae.

Length (head, thorax, and gaster), 2.5 mm, the ovipositor 0.9 mm. Colour yellowish brown, the head, and lateral patches on pronotum, propodeum, and gastral tergites, darker.

Male. — Head (figs. 8, 9) long and narrow when seen from above, rather high in lateral aspect; an anterior groove bears the antennae, in between lateral elevations. Eyes large and distinct. Antenna (fig. 11) consisting of six free segments; the scape as long as the pedicel and three funicular segments combined, with three long setae and a field of seven circular sensilla along the ventral (axial) margin; the pedicel as long as the funicle; the three funicular segments subequal; the club, which has a distinct line dividing it in two segments, bears many sensilla of various kinds on the distal part. Mandible (fig. 13) robust, with one gland; labium and maxillae atrophied.

Thorax, fig. 10. Pronotum as long as the combined lengths of the mesonotum and propodeum; the metanotum visible laterally; the propodeal spiracles large and circular. Fore leg much as in *A. paradoxum*, as depicted by Wiebes (1968, fig. 15), and also the hind leg resembling that of *A. paradoxum* (ibid., fig. 14). Fore tarsus consisting of two segments in ratio 7 : 10, with about seven and three or four ventral cones (or spines), respectively. Mid leg (fig. 14) slender; the tibia as long as the tarsus, its apical edge produced into a dorsal and a ventral tooth; the tarsal segments approximately in ratio 6 : 5 : 5 : 2 : 8 (fourth and fifth incompletely se-

parate), with ventral cones. Hind tibia (fig. 12) with one dorsal and two ventral teeth; the tarsal segments approximately in ratio 10 : 6 : 5 : 4 : 10, with ventral cones.

Gaster: the genitalia simple, without parameres or claspers.

Length (head and thorax), ca. 1.5 mm. Colour uniform yellowish brown.

Agaon spatulatum Wiebes

Material. — 2 ♀, Nigeria, W.-state, Ile-Ife, iii.1969 and 7.i.1970, leg. J. T. Medler, black light trap (RMNH 1231, 1253).
2 ♀, Nigeria, MW.-state, Benin, 8.iv.1973, leg. J. T. Medler, at light (RMNH 2401).
1 ♀, Nigeria, EC.-state, Umuahia, 11.iv.1973, leg. J. T. Medler, at light (RMNH 2400).

The species was previously recorded from Congo [Zaïre] (Wiebes, 1968: 352) and Ivory Coast (Wiebes, 1969: 452).

Agaon paradoxum Dalman (figs. 15-17)

Material. — 2 ♀, Nigeria, W.-state, Ile-Ife, 7.i.1970, leg. J. T. Medler, black light trap (RMNH 1201, one specimen slide-mounted).
1 ♀, Nigeria, W.-state, Effon-A, 2.iii.1970, leg. J. T. Medler, at light (RMNH 1716).
1 ♀, Nigeria, NW.-state, Abuja, 20.iii.1972, leg. J. T. Medler, at light (RMNH 2234).
1 ♀, Nigeria, EC.-state, Umuahia, 11.iv.1973, leg. J. T. Medler, at light (RMNH 2403).
1 ♀, Nigeria, SE.-state, Serti, 29.iii.1970, leg. J. T. Medler, at light (RMNH 2235).
12 ♀ 5 ♂, Uganda, Mpanga, 6.ix.1968, leg. D. S. Hill, ex *Ficus cyathistipula* (no. 54) (RMNH 1317, 1 ♀ and 1 ♂ slide-mounted; ex coll. Hill).

Variation. — With a previous record (Wiebes, 1968: 351-352) I discussed the possible synonymy of *Agaon paradoxum* Dalman, *A. fasciatum* Waterston, and *A. tridentatum* Joseph. Although I should like to have it confirmed by the characters of the male from West Africa, and by a record of its host *Ficus*, there is no reason to doubt the identity of *A. paradoxum* and *A. fasciatum*. The following variation is apparent in the length of the eyes, and in the number of transverse rows of crenulations on the mandibular appendage, viz.,

East Africa: the eye is rather small, and the cheek short (fig. 15); the appendage bears fifty transverse rows (RMNH 1317);

Central Africa: the cheek is longer (fig. 16); the appendage bears over 65 rows (RMNH 1133);

West Africa: the eyes are more bulging, the cheek is short (fig. 17); the appendage has a low number of rows (50 in RMNH 1201, and 45 in Joseph's description of *A. tridentatum*) or a higher number (60-65, RMNH 1716, 2234, 2235). I postpone a more definitive statement on the identity of *A. tridentatum* till more samples, including males, will be available.

Agaon baliolum spec. nov. (figs. 18-20)

Material. — 26 ♀, Nigeria, SE.-state, Obudu, cattle range, 5000 ft. alt., iii.1971, leg. J. T. Medler, at light (RMNH 1725, 2238, alcohol- and dry specimens, respectively; the holotype and a paratype slide-mounted).

1 ♀, same locality and collector, 13.iv.1973 (RMNH 2402).

Description (in comparison with *Agaon paradoxum*). — Female. Head (fig. 18) more than 1½ times as long as wide across the compound eyes; the longitudinal diameter of the eye about half as long as the cheek (8 : 15). Vestiges of lateral ocelli are visible under high magnification. The epistomal ridge of the usual type, but the clypeal part of the face with a short transverse row of long setae instead of an oblong patch of smaller setae. The process of the third antennal segment (fig. 21) gradually tapers to a point; the fourth segment distinctly reaches beyond the apex of this process. Mandible (fig. 19) with six prominent teeth or ridges, and as many smaller ridges in between; the appendage with about fifty transverse rows of crenulations.

Thorax with sternal and coxal pollen pockets. Fore wing (7 : 3), 2 mm long; the marginal, stigmal, and postmarginal veins approximately in ratio 1 : 1 : 2; the membrane with microtrichiae and spurious veins. Hind wing (5 : 1), 1.2 mm long. Fore tibia as in fig. 20, the tarsal segments in ratio 12 : 6 : 3 : 3 : 4; for the mid and hind tarsi these ratios are 11 : 9 : 7 : 6 : 6, and 15 : 10 : 8 : 7 : 7, respectively.

Length (head, thorax, and gaster), 2 mm, the ovipositor 1.1 mm. Colour brown; the head darker, almost chestnut-brown, the extremities somewhat lighter than the body.

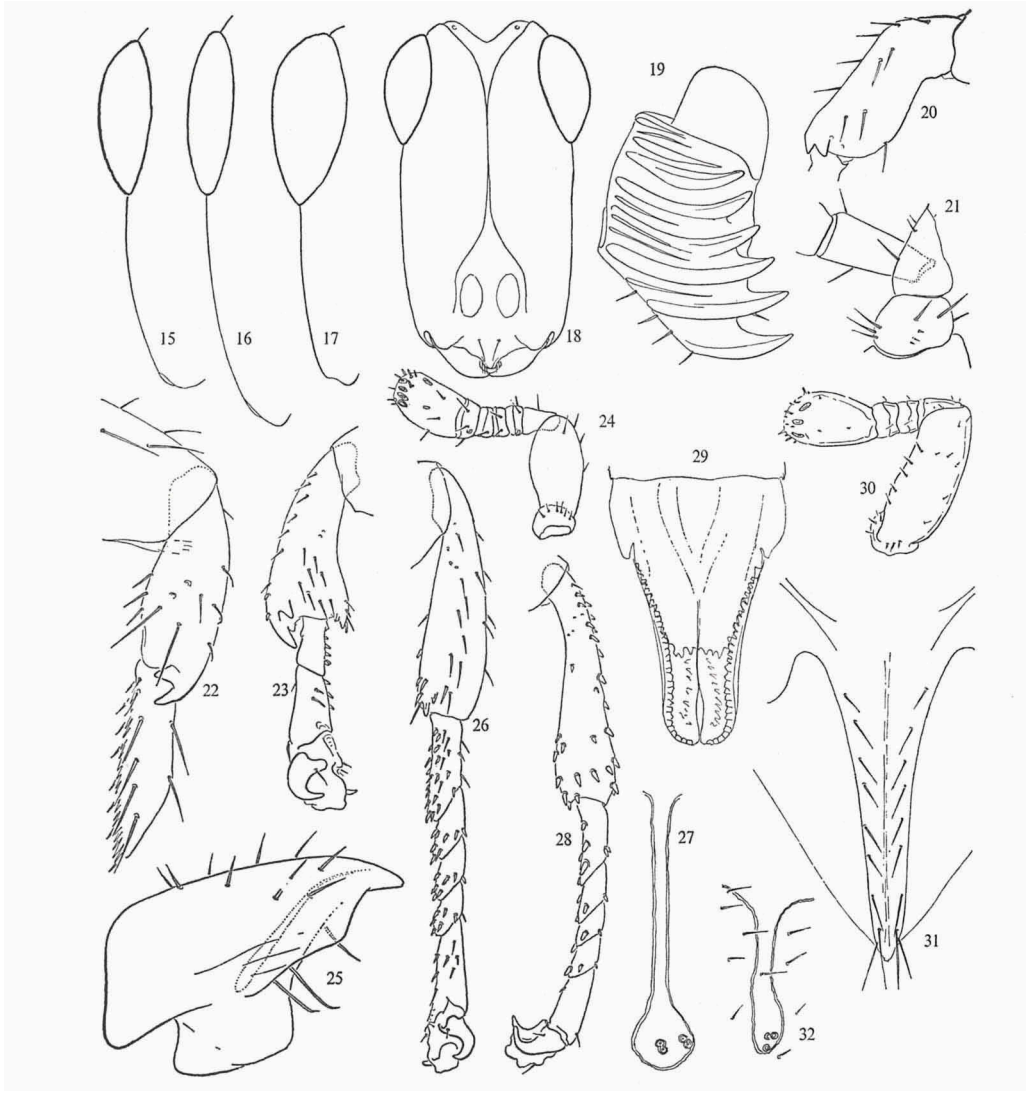
Species-group of *Agaon hamiferum* (Kieffer)

This is the group that, if ever treated at a (sub-)generic level, should be called *Courtella* Kieffer, 1911.

Key to species [1])

1. Females 2
— Males 8
2. Metatarsus of the fore leg with a series of antiaxial, conical spines . . . 3
— Spines of the metatarsus, if present in any number, slender and not cone-shaped 4
3. Antennal scape produced apically, and also the pedicel and third segment with long apical, spatulate outgrowths; the mandible with 75-80 ventral ridges *A. medleri*
— Antennal scape normal, as also the pedicel and the third segment; the mandible with four ventral teeth . . . . . *A. hamiferum*
4. Mandible with one apical tooth, and with or more ventral ridges (not, or not very distinctly, produced into teeth) 5
— The ventral ridges of the mandible produced into strong teeth, four to eight in number 7

1) The males of *A. scobiniferum* and *armatum* are not known.



Figs. 15-17. *Agaon paradoxum* Dalman, relative length of the eye and the cheek, in females from the following localities. 15, Mpanga, Uganda (RMNH 1317); 16, Coquilhatville [Mbandaka], Congo [Zaïre] (RMNH 1133, recorded by Wiebes, 1968: 346); 17, Mt. Nimba, Guinea (reproduced from Joseph, 1959, fig. I, 1; RMNH 1201 is similar). Figs. 18-21. *Agaon baliolum* spec. nov., female. 18, head, outline; 19, mandible, ventral aspect; 20, fore tibia, antiaxial aspect; 21, second to fourth antennal segments, ventral aspect. Figs. 22-27. *Agaon camerunensis* spec. nov. 22, 27, female holotype; 23-26, male paratype. 22, fore tibia and metatarsus (female), antiaxial aspect; 23, fore tibia and tarsus (male), antiaxial aspect; 24, antenna, dorsal aspect; 25, mandible, ventral aspect; 26, hind tibia and tarsus, antiaxial aspect; 27, stigmal vein of fore wing. Figs. 28-32. *Agaon peniculum* spec. nov. 31, 32, female holotype; 28-30, male paratype. 28, mid tibia and tarsus, antiaxial aspect; 29, genitalia; 30, antenna, dorsal aspect; 31, hypopygium; 32, stigmal vein of fore wing. Figs. 15-18, 31, × 65; 23, 24, 26, 28, 30, × 105; 19-22, 25, 27, 29, 32, × 210.

5. Head short and wide, the length 1¼ times the width across the eyes; the cheek twice as long as the eye . . . . . *A. scobiniferum*
— Head much longer, 1½-2 times as long as wide across the eyes; also the cheek longer (2½-3 times the longitudinal diameter of the eye) 6
6. Antennal sensilla long and flexible, much longer than the segments *A. camerunensis*
— Antennal sensilla short and rather stiff, shorter than the segments *A. peniculum*
7. Mandible with eight very strong, ventral teeth; the head twice as long as wide across the eyes, the cheek three times as long as the eye . . . . *A. armatum*
— Mandible with three or four weaker, ventral teeth; the head 1½ times as long as wide across the eyes, the cheek 2-2½ times as long as the eye. Fore wing with a dark patch at the base of the stigmal vein (not known for *A. armatum*) . . . . . *A. bekiliensis*
8. Antennae and mandibles inserted on anterior outgrowths of the head; both are peculiar in shape (Wiebes, 1972, figs 1, 4, 10) . . . . . *A. medleri*
— Antennae and mandibles more normal 9
9. Antenna with two funicular segments. Propodeal spiracles very large (fig. 42), ventro-lateral in position . . . . . *A. peniculum*
— Antenna with three funicular segments. Propodeal spiracles smaller (fig. 43) . 10
10. Antennal groove rather deep, distinctly reaching the level of the eyes *A. hamiferum*
— Antennal groove wide and short, not reaching the level of the anterior edge of the eyes, or antennal sockets more distinctly separate 11
11. Head a little longer than wide (18-20: 17); the eyes small: slightly over half as long as the cheek, one-sixth of the total length of the head . . . *A. bekiliensis*
— Head much longer than wide (4: 3); the eyes as long as the cheek, one-fifth of the total length of the head . . . . . *A. camerunensis*

Agaon camerunensis spec. nov. (figs. 22-27, 39-41, 43)

Material. — Series ♀ ♂, Cameroons, Baganté, Bamiléké, ca. 1350 m alt., v.1964, leg. W. J. J. O. de Wilde, ex *Ficus* aff. *polita* (RMNH 1151, ♀ holotype and ♀ ♂ paratypes slide-mounted).

Description. — Female. Head (fig. 39) 1½ times as long as wide across the compound eyes; the cheek 2½ times as long as the eye. Three ocelli. Antenna (fig. 40) eleven-segmented; the scape almost four times as long as wide, with a hyaline dorsal edge, and a triangular ventral prominence; the pedicel very short, for a great part enclosed in the apical edge of the scape; the third segment and its process rather large, blunt, with three apical setae; the fourth segment long and slender, one quarter longer than the length of the third segment and its process; the fifth to eleventh segments with increasing numbers of long and flexible sensilla (approximately eleven to over twenty); the fifth longest, the sixth to eighth shorter and wider, the ninth and tenth equal to the eighth, the eleventh as long and as slender as the fifth. Mandible (fig. 41) with one apical tooth, its ventral surface with over fifteen transverse ridges; the appendage 2½ times as long as wide, with 25-30 transverse rows of about forty fine crenulations (not distinct in the proximal rows). Labium with an apical seta, the maxillae with one or two subapicals and several ventral setae.

Thorax with sternal and coxal pollen pockets. Fore wing (2 : 1), 2 mm long; the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 7 : 3 : 2 : 4; the stigma shaped like a knob (fig. 27), with four sensilla situated in two pairs; the membrane with small microtrichiae. Hind wing (4 : 1), 1.2 mm. Fore leg: the tibial comb (fig. 22) consisting of two teeth; the tarsal segments approximately in ratio 10 : 6 : 5 : 4 : 9, with ventral spines and a plantar fringe. Mid tarsus as long as femur and trochanter combined, and $1^1/_3$ times the length of the tibia; the tarsal segments approximately in ratio 16 : 12 : 9 : 8 : 9. Hind tibia with a very small, bidentate, ventral spur, and a narrow hyaline edge along the dorsal margin; the tarsal segments, bearing ventral spines and a plantar fringe, approximately in ratio 10 : 6 : 5 : 4 : 4.

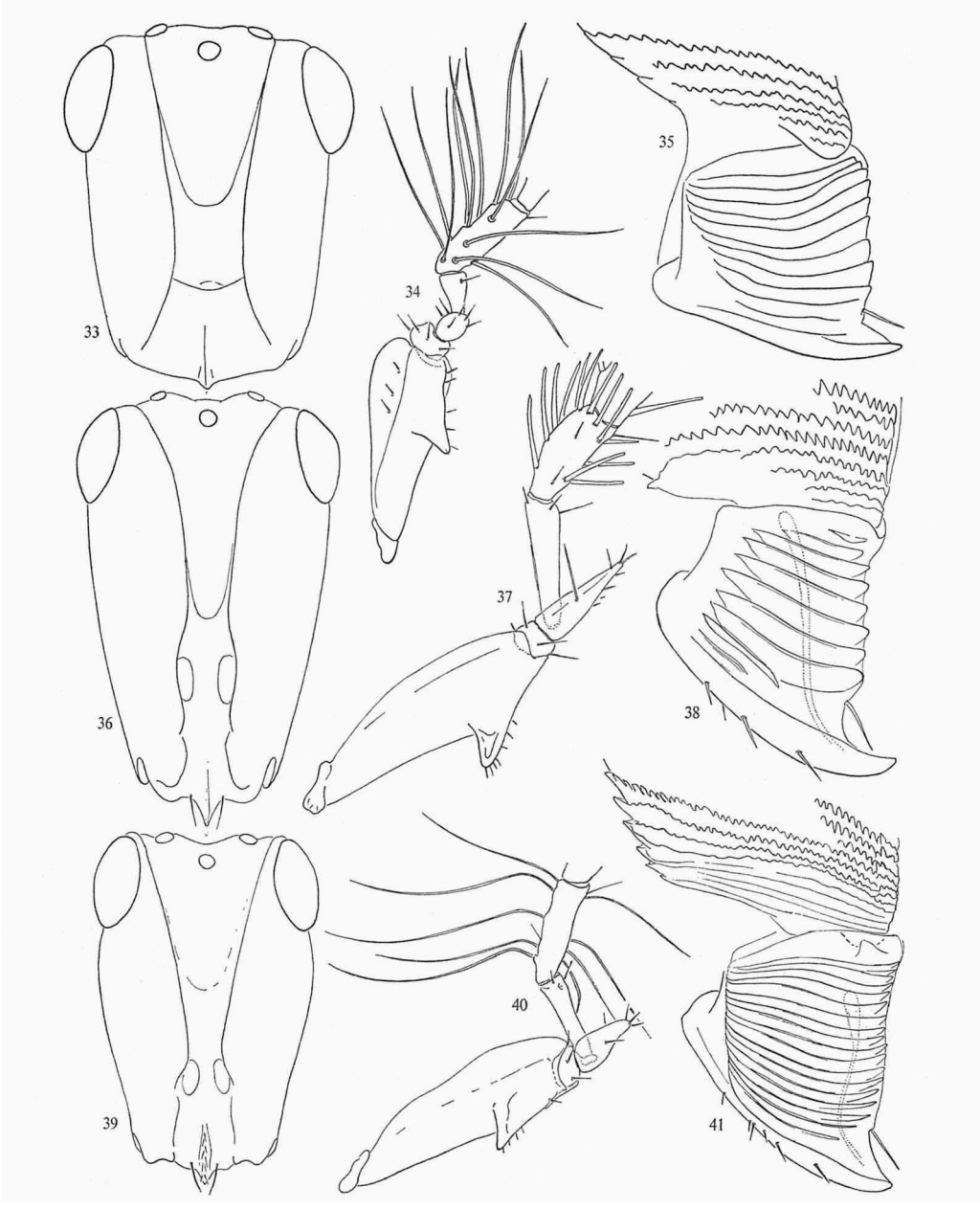
Gaster. The hypopygium short, the spine not projecting beyond the hyaline parts; the pygostyle short, rounded at the apex, with three long setae. Ovipositor as long as the gaster.

Length (head, thorax, and gaster), 2.1 mm. Colour rather uniform brown.

Male. — Head (fig. 43) distinctly longer than wide (ca. 4 : 3); the antennae in separate sockets. Epistomal edge produced medially. Eyes large, as long as the cheek. Antenna (fig. 24) consisting of seven free segments; the scape slightly over twice as long as wide; the pedicel short, as long as the three funicular segments combined; the club consisting of two segments, the distal one of which is four times as long as the proximal, with various sensilla. Mandible (fig. 25) with one apical tooth, and with the ventral margin produced into one subapical tooth; one gland. Labium and maxillae atrophied.

Thorax, fig. 43. Pronotum shorter than the combined lengths of the other terga (9 : 10), which are all fused; the propodeum longer than the mesonotum (measured laterally), and approximately half as long as the metanotal part of the dorsum, with relatively small, circular, dorsal, spiracular peritremata. Fore leg (fig. 23): the tibia with two dorsal teeth, and three or four ventrals; the tarsus bimerous (4 : 5), with five ventral cones on the first segment and four on the second. Mid tibia, both on the axial and antiaxial surfaces, and the tarsus, with many small spines; the tarsal segments approximately in ratio 12 : 6 : 4 : 5 : 10. Hind leg (fig. 26): the coxa with a patch of small conical spines on the axial surface; the tibia with some spines in the ventral angle, where also two teeth are visible; the tarsal segments approximately in ratio 16 : 7 : 5 : 6 : 10, with many ventral spines.

Gaster: the genitalia simple, without claws or parameres.



Figs. 33-41. Outline of female head (33, 36, 39), proximal segments of antenna (34, 37, 40), mandible and proximal part of appendage (35, 38, 41) of: 33-35, *Agaon scobiniferum* Waterston (from Waterston, 1920, fig. 2a-c); 36-38, *A. peniculum* spec. nov.; 39-41, *A. camerunensis* spec. nov. Figs. 33, 36, 39, × 65; 34, 37, 40, × 105; 35, 38, 41, × 210.

Length (head and thorax), 1.4 mm. Colour yellowish brown, the head much darker.

Host. — Mrs. B. de Wilde-Duijfjes (21.viii.1969, in litt.) wrote to me the following note on the host plant of sample RMNH 1151 (translated): "The identification of this liana is doubtful, *Ficus polita* being a tree, but no other name applied better". Material of the *Ficus* is preserved in the herbarium of the Laboratorium voor Plantensystematiek en -geographie, Wageningen, The Netherlands, under no. De Wilde 2581.

Agaon peniculum spec. nov. (figs. 28-32, 36-38, 42)

Material. — 11 ♀ 11 ♂, Uganda, Makerere Univ. Campus, 4.v.1969, leg. C. Lwanga, ex *Ficus* spec. "U" (?) (RMNH 1295, ♀ holotype and ♂ paratype slide-mounted; ex coll. Hill).

13 ♀ 2 ♂, Uganda, Mabira, 4.v.1969, leg. C. Lwanga, ex *Ficus* spec. (RMNH 1292, 1 ♀ and ♂ slide-mounted; ex coll. Hill).

27 ♀ 23 ♂, Ghana, Kumasi, Katinkrono, 21.viii.1971, leg. L. E. Newton, ex *Ficus dryepondtiana* (RMNH 2000, 2001, 1 ♀ and 1 ♂ slide-mounted).

Description (in comparison with *Agaon camerunensis*). — Female. Head (fig. 36) 1½ times as long as wide across the compound eyes; the cheek three times as long as the eye. Three ocelli. Antenna (fig. 37) eleven-segmented; the scape, pedicel and fourth segment as in *A. camerunensis,* the third segment more acute; the fifth to eleventh segments with approximately fifteen short, rather stiff sensilla, like the hairs of a broom; the fifth segment is over two-thirds the length of the fourth, the sixth somewhat shorter, while the seventh to eleventh are half as long as the fourth but distinctly wider. Mandible (fig. 38) with one apical tooth, its ventral surface with about ten transverse ridges; the appendage three times as long as wide, with about 35 transverse ridges of 40-45 fine crenulations (indistinct proximally).

Thorax. Fore wing (2 : 1), 2.2 mm long; the submarginal, marginal, stigmal (fig. 32, with three sensilla), and postmarginal veins approximately in ratio 15 : 5 : 2 : 7; the membrane with sparse microtrichiae. Hind wing (3 : 1), 1.2 mm long. Tarsal ratios of the legs: fore tarsus, 8 : 4 : 4 : 3 : 6; mid tarsus, 11 : 7 : 7 : 6 : 6; hind tarsus, 12 : 7 : 7 : 6 : 8.

Gaster. The hypopygium (fig. 31) as in *A. camerunensis,* but the lateral off-shoots of the dark V more distinctly curved. Ovipositor little shorter than the gaster.

Length (head, thorax, and gaster), 3 mm. Colour, in particular that of the dorsal surface, dark brown.

Male. — Head (fig. 42) slightly longer than wide posteriorly (low in lateral aspect); the antennae in separate sockets. Epistomal edge with a median, triangular lobe, and two median lobes on either side. Eyes distinct. Antenna (fig. 30) consisting of five free segments; the scape large, three times as long as wide; the pedicel short, as long as the two funicular segments combined; the club half as long as the scape, with various sensilla. Mandible with three teeth, viz., one apical and a subapical both ventrally and dorsally; one gland. Labium and maxillae atrophied.

Thorax, fig. 42. Pronotum about as long as the combined lengths of the other terga; the fused meso- and metanota (a small lateral incision indicates the boundary between the two) incompletely separate from the propodeum, and three times as long. Propodeal spiracles large, ventro-lateral in position. The legs much as in *A. camerunensis,* but the segments of the fore tarsus subequal, with three ventral conical spines on the first segment. Mid tibia and tarsus, fig. 28.

Gaster. The aedeagus (fig. 29) has a strong edge all around the apex.

Length (head and thorax), 1.8 mm. Colour yellowish, the head brown.

Host. — Dr. Newton (3.iii.1972, in litt.) noted that the fig from which sample RMNH 2000 was reared, "keys out to *Ficus dryepondtiana* in the Flora of West Tropical Africa, but is well outside the distribution range shown in the flora. It is close to *Ficus elegans*". It is preserved in the Department of Biological Sciences, University of Science and Technology, Kumasi, Ghana, under no. 1432.

Agaon scobiniferum Waterston (figs. 33-35)

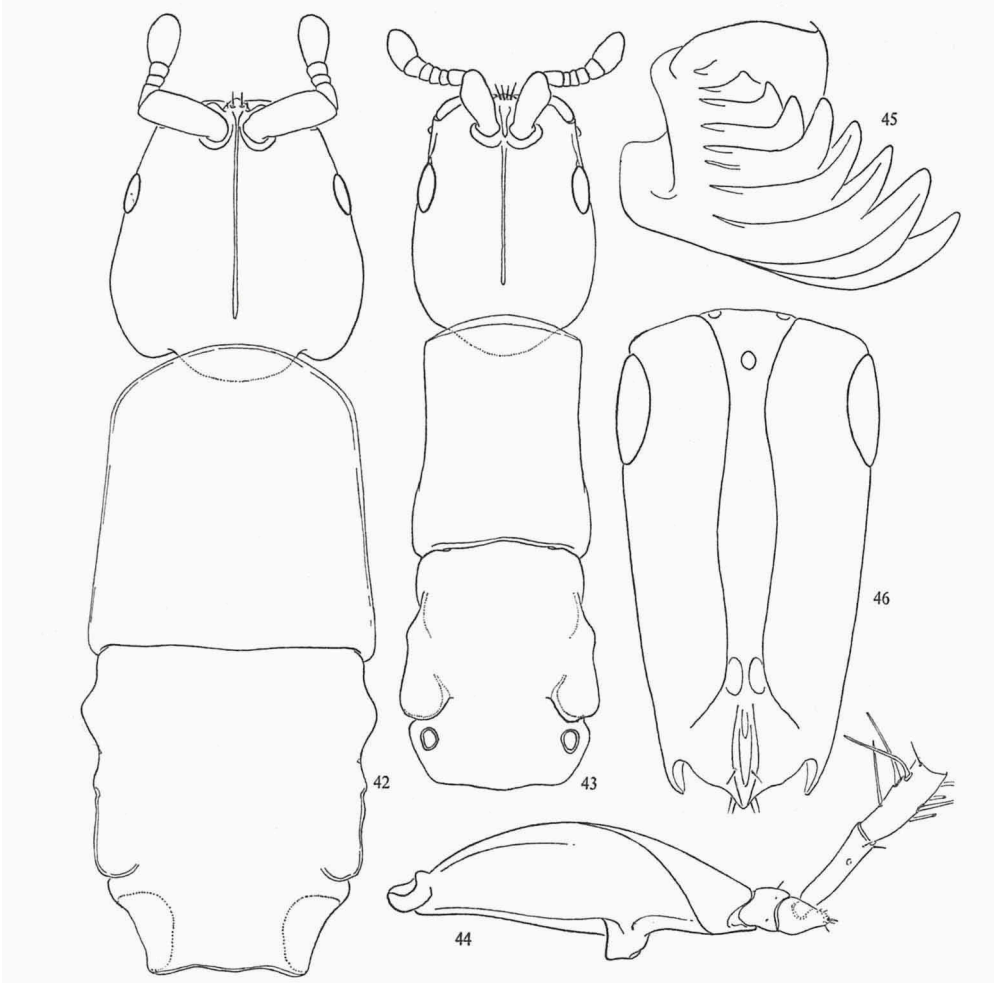
No new material is available of this species described from the sycones of *Ficus lukanda* from Uganda. Some of Waterston's figures are here reproduced for comparison with those of *Agaon camerunensis* and *peniculum.*

Agaon armatum spec. nov. (figs. 44-46)

Material. — Series ♀, Nigeria, W.-state, Ile-Ife, 3.x.1969, leg. J. T. Medler, ex *Ficus* spec. later labelled as *F. mucuso* (Medler no. 10) (RMNH 1210, 1717, the holotype and a paratype slide-mounted).

Description. — Female. Head (fig. 46) twice as long as wide across the compound eyes; the cheek three times as long as the longitudinal diameter of the eye. Three ocelli. Epistomal margin produced; face with a longitudinal ridge running from the antennal toruli to the tip of the clypeal prominence. Antenna (fig. 44) in all specimens broken at the sixth segment;

the scape long (3 : 1), apically produced at the ventral side and with a very strong prominence at two-thirds of its length; the pedicel short; the third segment very short and blunt, with one apical spine; the fourth segment as long as the pedicel and the third segment combined, slightly longer than the fifth; what is present of the flagellar segments bears about fifteen sensilla, which are subequal in length to the segment. Mandible (fig. 45) with about eight very strong ventral teeth; the appendage with about 40-45 transverse rows of approximately thirty fine crenulations. Labium with



Figs. 42-43. Male head and thorax of: 42, *Agaon peniculum* spec. nov.; 43, *A. camerunensis* spec. nov. Figs. 44-46. *Agaon armatum* spec. nov., female holotype. 44, proximal segments of antenna; 45, mandible, ventral aspect; 46, head, outline. Figs. 42, 43, 46, × 65; 44, × 105; 45, × 210.

one apical seta; the maxillae with two subapicals and about six ventral setae.

Thorax with sternal and coxal pollen pockets. All specimens are devoid of wings. Fore tibia with two, rather strong, apical teeth; the tarsal segments approximately in ratio 11 : 4 : 4 : 3 : 6. Ratio of mid tarsus, 7 : 4 : 3 : 3 : 4. Hind tibia with a small, bidentate, ventral spur, a hyaline dorsal edge, and antiaxial spines; the tarsal segments approximately in ratio 10 : 6 : 6 : 5 : 5.

Gaster. Hypopygium rather acute, the tip with two small setae, on either side two long setae situated close together, and one more proximally, next to the normal rows of setae along the arms of the V. Ovipositor as long as the gaster.

Length (head, thorax, and gaster), 3.2 mm. Colour brown.

Host. — See the note under *Agaon bekiliensis bispinosum.*

Agaon hamiferum (Kieffer)

For the sake of completeness I mention this species, which has one subspecies in West Africa (redescribed by Grandi, 1916: 207-221, sub *A.* ? *paradoxum*) and one in East Africa (*A. h. modestum* Wiebes, 1961). *A. h. modestum* is the subspecies used for the description of the female reproductive system by Copland et al. (1973), sub *Agaon paradoxum* (from *Ficus brachypoda,* Uganda).

Agaon medleri Wiebes

Material. — 18 ♀, Nigeria, W.-state, Ile-Ife, 22.iv.1970, leg. J. T. Medler, at light (RMNH 1719).

Host. — The present sample, which should have been recorded with the original description of the species (Wiebes, 1972), was caught at light. The original sample from Idanre (Nigeria) was reared from *Ficus umbellata,* as Dr. Medler informed me later (7.vii.1972, in litt.).

Agaon bekiliensis (Risbec)

This species has two subspecies. New material, better preserved than the slide-mounted specimens of *A. bekiliensis* used for the redescription (Wiebes, 1970) or the dry specimens of *A. bispinosum* (Wiebes, 1969), allows of some additional descriptive notes. The females have a dark patch at the base of the stigmal vein, and all veins are very clearly visible in the hyaline wing. The antennal sockets of the males are separate, although their partition is very narrow; this led to the description of a common groove for both (Wiebes, 1969: 456).

Agaon b. bekiliensis (Risbec)

Material. — 4 ♀ 25 ♂, Malagasy, Ankazobe, Miantso, Soavina, 1400 m alt., 8.iii.1972, leg. L. H. M. Blommers, ex *Ficus megapoda* (tree no. 6) (RMNH 2016).

10 ♀ 31 ♂, same locality and collector, 29.iii.1972, ex *Ficus megapoda* (tree no. 12) (RMNH 2056, 2062, 2068).

Series ♀ 11 ♂, Malagasy, near Ambohipena, banlieu Tana, 1300 m alt., 21.iii.1972, leg. L. H. M. Blommers, ex *Ficus megapoda* (tree no. 10) (RMNH 2087, 2092, 2096, 1 ♀ and 1 ♂ slide-mounted).

Series ♀ ♂, same locality, date, and collector, ex *Ficus megapoda* (tree no. 11) (RMNH 2029).

Host. — Botanical specimens are preserved in the Rijksherbarium, Leiden, The Netherlands.

Agaon bekiliensis bispinosum Wiebes

Material. — 4 ♀ 1 ♂, Nigeria, W.-state, Ile-Ife, 22.iv.1970, leg. J. T. Medler, ex *Ficus mucuso* Welw. ex Ficalho (RMNH 1708, 1 ♀ slide-mounted).

Host. — *Ficus mucuso* is a species of the subgenus *Sycomorus*. Dr. Medler sent another sample of fig wasps reared from this species in Nigeria, with a (pair of) species of *Ceratosolen*. I have seen similar samples from Ghana, Zaïre, and Uganda. The present sample, with a species of *Agaon*, is quite distinct. Upon my request, Mrs. Medler checked the plant material against that in the Forestry Herbarium, Ibadan, and found her identification undoubtedly correct (Medler, 7.vii.1972, in litt.). I wonder whether some shifting of labels took place, as there are now three species with the record of *F. mucuso*, viz., the *Ceratosolen*, *Agaon bispinosum*, and *Agaon armatum* (see above).

Allotriozoon Grandi, 1916

Allotriozoon Grandi, 1916, Boll. Lab. Zool. Portici 10: 182-191 (descr. ♀, ♂, key to two species; type-species *A. prodigiosum* Grandi, designated by Gahan & Fagan, 1923, Bull. U.S. nat. Mus. 124: 10); Wiebes, 1961, Zool. Meded. 37: 238 (key); Grandi, 1963, Boll. Ist. Ent. Univ. Bologna 26: 356-357 (cat.); Hill, 1967, Zool. Verh. 89: 9 (key); Wiebes, 1974, Zool. Meded. 46: 34, 36 (key).

Key to species (females [1])

1. Oral margin of the mandible, and that of its apical tooth, finely denticulate. Number of ventral rows of crenulations on the mandibular appendage less than ca. thirty, the number of crenulations per row up to ca. ten . . . . . *A. heterandromorphum*
— Oral margin of the mandible and that of its apical tooth, smooth. Number of rows on the appendage larger, as is the number of crenulations per row 2

1) Males are known of *A. prodigiosum* and *heterandromorphum*, see the key by Grandi (1916: 191).

2. Number of ventral rows of crenulations on the mandibular appendage between ca. forty and fifty, the number of crenulations per row up to twenty. Apical teeth of the fore tibia relatively short, the tooth of the hind tibia short, subtriangular (Grandi, 1916, fig. xviii, 8) . . . . . *A. prodigiosum*

— Number of rows on the appendage over sixty, the number of crenulations per row ca. forty. Apical teeth of the fore tibia long and strong, the tooth of the hind tibia very large, evenly bidentate . . . . . *A. nigeriense*

Distribution. — The approximate localites for the species of *Allotriozoon* are indicated on the map of fig. 47.

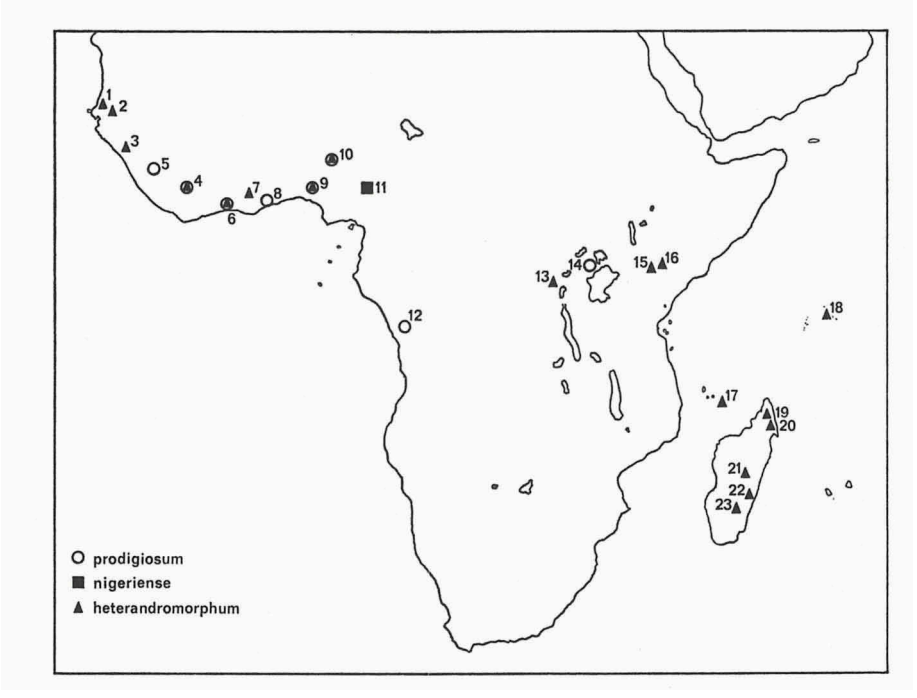


Fig. 47. Approximate localities of *Allotriozoon*. Senegal: 1, Dakar; 2, M'Bambey. Guinea: 3, Conakry; 4, Nimba Mts. Sierra Leone: 5, Loma Mts. Ivory Coast: 6, Bingerville. Ghana: 7, Kumasi; 8, Aburi. Nigeria: 9, Ile-Ife; 10, Abuja; 11, Obudu. Zaïre: 12, Tshela; 13, Walikale. Uganda: 14, Kampala (Mpanga, Makerere). Kenya: 15, Ft. Hall; 16, Embu. Comores Is.: 17, Mayotte. Seychelles Is.: 18, Mahé. Malagasy: 19, Analabava; 20, Sambava; 21, Tananarive; 22, Mananjary; 23, Ambalavao.

Allotriozoon nigeriense spec. nov. (figs. 48-53)

Material (see map, fig. 47). — 1 ♀, Nigeria, SE.-state, Obudu (loc. 11), cattle range, 1.iii.1971, leg. J. T. Medler, at light (RMNH 2226, slide-mounted).

Description. — Female (one specimen in rather poor state of preservation, having been dry and later relaxed in alcohol — and for that reason not described and figured in the usual detail). Head (fig. 49) $1^1/_3$ times as long as wide across the compound eyes; the cheek twice as long as the longitudinal diameter of the eye. No ocelli. Facial groove wide, narrowing towards the antennal toruli, which are situated close to the epistomal margin. Clypeal part of the face with a bilobed process of the shape usual for *Allotriozoon*. Antenna (fig. 48) consisting of eleven free segments; the scape and pedicel of the usual type; the third segment rather blunt, about as large as the fourth; the flagellar segment with characteristic sensilla, especially numerous on the eighth to eleventh segments. Mandible (fig. 52) robust, with one gland, the (smooth) teeth blunt as if worn, with about eight ventral ridges; the appendage four times as long as wide, with over sixty ventral rows of about forty fine crenulations.

Thorax with sternal and (indistinct) coxal pollen pockets. Fore wing (2 : 1), 1.75 mm long; the submarginal, marginal (boundary between the two ill-defined), stigmal, and postmarginal veins approximately in ratio 10 : 6 : 4 : 1; the membrane with microtrichiae. Hind wing (5 : 1), 1.2 mm long. Fore leg: the tibial armature (fig. 51) consisting of two long, strong, apical teeth; the metatarsus with a row of plantar spines (and longer axial spines); the tarsal segments approximately in ratio 16 : 8 : 6 : 5 : 8 (measured along the plantar edge, each segment sheathing the base of the next). Mid tarsi approximately in ratio 6 : 6 : 5 : 4 : 4. Hind tibia (fig. 53) with a large and robust, evenly bidentate, ventral tooth, one spine axially of this tooth, and a series of small axial spines on the disk; the tarsi approximately in ratio 8 : 6 : 4 : 3 : 5, with apical spines, the metatarsus with a series of ventral spines.

Gaster. Hypopygium (fig. 50) rather acute, with two rows of setae (large and smaller) on either side of the mid-line. Ovipositor as long as the gaster.

Length (head, thorax, and gaster), 3.2 mm. Colour brown, the legs yellowish.

Allotriozoon heterandromorphum Grandi (figs. 54-58)

Allotriozoon heterandromorphum Grandi, 1916, Boll. Lab. Zool. Portici 10: 191, 200-206, figs. 21-23 (descr. ♀, ♂, Senegal: Dakar - loc. 1; Guinea: Conakry - loc 3, host *Ficus Vogeli*); Joseph, 1959, Proc. R. ent. Soc. London (B) 28: 32 (Guinea: Nimba Mts. - loc. 4); Wiebes, 1969, Ann. Mus. Roy. Afr. centr., in 8°, Zool. 175: 457 (Ivory Coast: Bingerville - loc. 6); Wiebes, 1970, Zool. Meded. 45: 3, 5 (synon.).

Blastophaga wanei Risbec, 1951, Mém. Inst. franç. Afr. noire 13: 385-386, fig. 172d, e (descr. ♂ [♀ excluded], Senegal: M'Bambey - loc. 2, host *Ficus gnaphalocarpa* [most probably false]); Grandi, 1952, Boll. Ist. Ent. Univ. Bologna 19: 76 (in *Elisabethiella* Grandi [false]).

Blastophaga dakarensis Risbec, 1954, Bull. Inst. franç. Afr. noire (A) 16: 536-538, fig. 2 (descr. ♀, Senegal: Dakar - loc. 1); Wiebes, 1961, Zool. Meded. 37: 236 (in *Elisabethiella* Grandi [false]).

Allotriozoon seychellense Masi, 1917, Novit. zool. 24: 123, figs. 1-2 (decr. ♀, Seychelles Is.: Mahé - loc. 18), **syn. nov.**

Material (see map, fig. 47). — Series ♀ ♂, Ghana, Kumasi (loc. 7), Univ. Sci. & Techn., at E.-end of community-center, 22.vi.1971, leg. L. E. Newton, ex *Ficus vogelii* (Miq.) Miq. (RMNH 1928, 2 ♀ slide-mounted, 1934).

61 ♀, Nigeria, W.-state, Ile-Ife (loc. 9), several data in 1969 and 1970, as follows: 20.i.1970 (18 ♀, RMNH 1206, 1222), iii.1969 (3 ♀, RMNH 1228), v.1969 (1 ♀, RMNH 1233), vi.1969 (7 ♀, RMNH 1215), viii.1969 (5 ♀, RMNH 1237), ix.1969 (6 ♀, RMNH 1242), x.1969 (6 ♀, RMNH 1246), xi. 1969 (12 ♀, RMNH 1218), xii.1969 (3 ♀, RMNH 1249), leg. J. T. Medler, black light trap.

2 ♀, Nigeria, NW-state, Abuja (loc. 10), 20.iii.1972, leg. J. T. Medler, at light (RMNH 2399, 1 ♀ slide-mounted).

2 ♀, Congo [Zaïre], 39 km S. of Walikale (loc. 13), 700 m alt., 25.iii.1957, leg. E. S. Ross & R. E. Leech (CAS).

16 ♀ 9 ♂, Kenya, Fort Hall (loc. 15), 19-23.iii.1968, leg. C. van Someren (no. 23), ex *Ficus* spec. (RMNH 1329, 1 ♀ slide-mounted; ex coll. Hill).

5 ♀ 1 ♂, Kenya, 4 mi from Embu (loc. 16), 3.iii.1968, leg. C. van Someren (no. 28), ex *Ficus* spec. (RMNH 1328, 1 ♀ slide-mounted; ex coll. Hill).

25 ♀, Comores Is., Mayotte, Dembeni (loc. 17), i.1972, leg. Brunhes, at light (RMNH 2182, 1 ♀ slide-mounted; ex coll. Blommers).

24 ♀, Malagasy, Analabava (loc. 19), PK 35 S. of Vohemar, 10-14.xi.1968, leg. A. Peyrieras & P. Griveaud, at light (RMNH 2179; ex coll. Blommers).

14 ♀, Malagasy, 42 km N. of Sambava (loc. 20), 16-20.xi.1968, leg. A. Peyrieras & P. Griveaud, at light (RMNH 2176; ex coll. Blommers).

Series ♀ ♂, Malagasy, Tananarive, Tsimbazaza (loc. 21), 1350 m alt., 13.iv.1973, leg. L. H. M. Blommers, ex *Ficus baroni* (RMNH 2362, 3 ♀ and 2 ♂ slide-mounted).

4 ♀, Malagasy, Mananjary (loc. 22), dunes, 31.xii.1971, leg. L. H. M. Blommers, ex *Ficus baroni* (RMNH 2042).

10 ♂, same locality and collector, 14.i.1973, ex *Ficus baroni* (RMNH 2390).

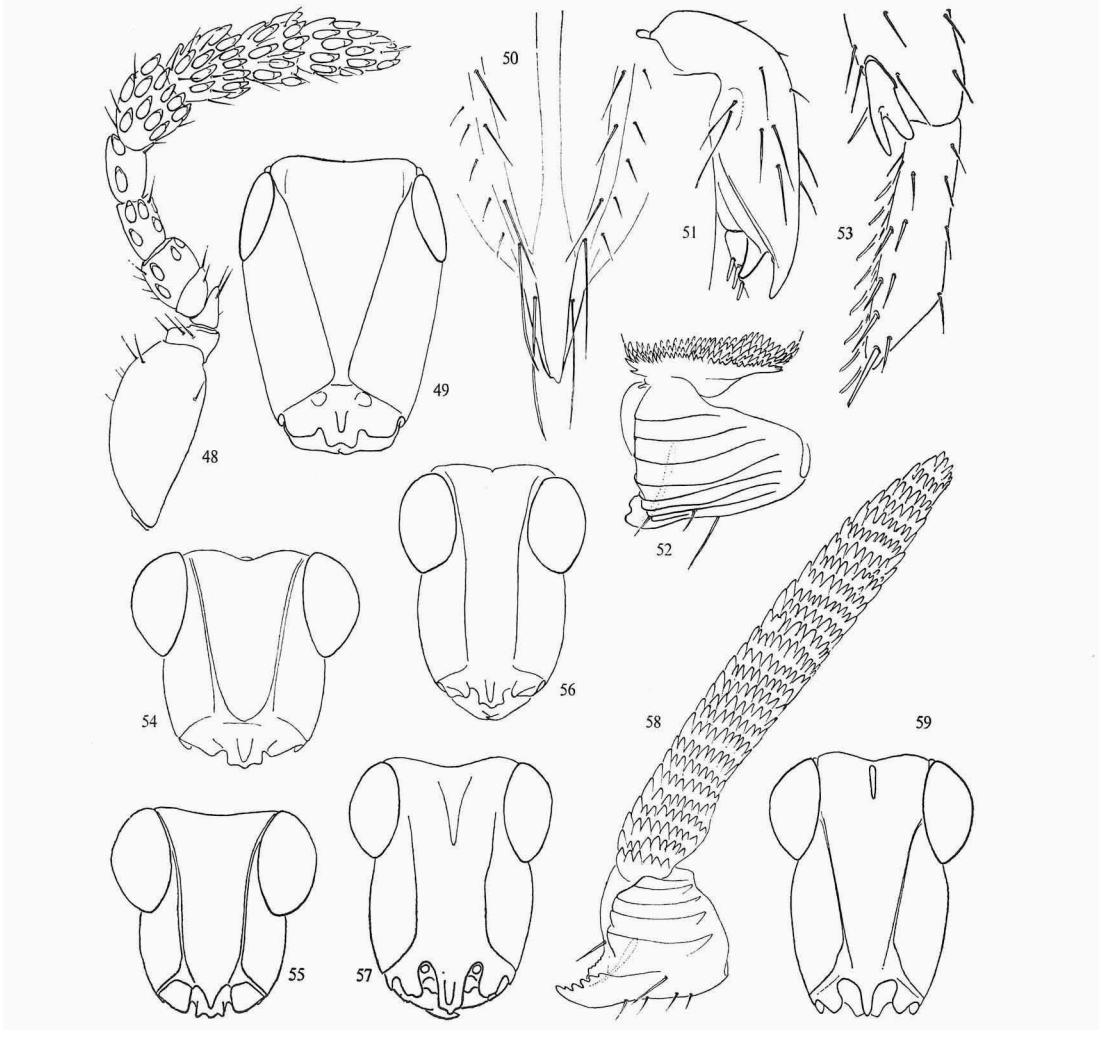
1 ♀, Malagasy, Ambalavao (loc. 23), 1000 m alt., 11 km S. on RN 7, 14.xii.1972, leg. Cremers & Delobel, ex *Ficus baroni* (RMNH 2118; ex coll. Blommers).

Variation. — In his description of *Allotriozoon*, Grandi (1916: 190) referred to a number of specimens from the Seychelles Isles that he did not care to describe, because of their poor state of conservation. A year later, Masi did describe this sample as a new species, *A. seychellense*. The differential characters, mentioned by Masi (1917: 124), are the following: intermediate between *A. prodigiosum* and *A. heterandromorphum*, but closer to the former ("*prodigio* tamen affinis"; Grandi, 1916: 190, noted: "sembravano affini all'*A. prodigiosum*"), although the proportions of the head are as in the latter; also the oral margin of the mandible denticulate as in *A. heterandromorphum*; the mandibular appendage with ca. thirty rows of 8-9 denticulations.

I do not understand Grandi's and Masi's remarks on the affinity of *A. seychellense* and *prodigiosum*, as from the description of *A. seychellense*

it seems to me to represent a female of *A. heterandromorphum* with a long head and cheek.

The head of *A. seychellense* is longer than in any of the specimens studied



Figs. 48-53. *Allotriozoon nigeriense* spec. nov., female holotype. 48, antenna, axial aspect; 49, head, outline; 50, hypopygium; 51, fore tibia, antiaxial aspect; 52, mandible and proximal part of appendage; 53, apex of hind tibia, and metatarsus, antiaxial aspect. Figs. 54-58. *Allotriozoon heterandromorphum* Grandi, outline of female head (54-57), and mandible and appendage (58) of specimens from: 54, Kenya (RMNH 1328); 55, Senegal (from Grandi, 1916, fig. xxi, 1); 56, Comores Is. (RMNH 2182); 57, Seychelles Is. (from Masi, 1917, fig. 1); 58, Comores Is. (RMNH 2182). Fig. 59. *Allotriozoon prodigiosum* Grandi, outline of female head. Figs. 48, × 105; 49, 54-57 59, × 65; 50-53, 58, × 210.

by me, and the number of ventral rows on the mandibular appendage is larger. In the following short list, the length/width ratio of the head is noted for several samples, as is the ratio length cheek to longitudinal diameter of eye, and the number of rows on the appendage.

RMNH 1328, 1329 (Kenya) (fig. 54): l/w 0.9-1.2; cheek 1.0; rows 24.

Grandi, 1916: 201 (Senegal) (fig. 55): l/w 1.05; cheek 1.0; rows 20-22.

RMNH 2362 (Malagasy): l/w 1.1; cheek 1.1; rows 22-24.

RMNH 2182 (Comores Is.) (fig. 56): l/w 1.3; cheek 1.3; rows 27-28 (fig. 58).

Masi, 1917: 123 (Seychelles Is.) (fig. 57): l/w 1.7; cheek 1.3; rows ca. 30.

I conclude that *A. seychellense* Masi is a synonym of *A. heterandromorphum* Grandi.

Host. — The host *Ficus* of samples RMNH 1928 and 1934 was collected, and a voucher specimen is preserved in the herbarium of the Kumasi University (Ghana) under no. 1407.

Of the Malagasy figs, there are specimens in the Rijksherbarium, Leiden, The Netherlands.

Allotriozoon prodigiosum Grandi (fig. 59)

Allotriozoon prodigiosum Grandi, 1916, Boll. Lab. Zool. Portici 10: 191-200 figs. 17-22 (descr. ♀ ♂, Ghana: Aburi - loc. 8); Joseph, 1959, Proc. R. ent Soc. London (B) 28: 32 (Guinea: Nimba Mts. - loc. 4); Wiebes, 1969, Ann. Mus. Roy. Afr. centr., in 8°, Zool. 175: 457 (Ivory Coast: Bingerville - loc. 6); Wiebes, 1971, Mém. Inst. fond. Afr. noire 86: 367 (Sierra Leone: Loma Mts. - loc. 5, host *Ficus* cf. *eriobotryoides*).

Material (see map, fig. 47). — 53 ♀, Nigeria, W.-state, Ile-Ife (loc. 9), several data in 1969, 1970 and 1973, as follows: 20.i.1970 (20 ♀, RMNH 1205, 1207), iii.1969 (3 ♀, RMNH 1229), 8.iv.1973 (1 ♀, RMNH 2404), v. 1969 (3 ♀, RMNH 1232), viii.1969 (9 ♀, RMNH 1236), ix.1969 (8 ♀, RMNH 1241), x.1969 (6 ♀, RMNH 1245), xi.1969 (3 ♀, RMNH 1217), leg. J. T. Medler, black light trap.

1 ♀, Nigeria, NW.-state, Abuja (loc. 10), 20.iii.1972, leg. J. T. Medler, at light (RMNH 1225).

2 ♀, Nigeria, MW.-state, Benin (locality not indicated on the map of fig. 47; ca. 100 mi SE. of Ife), 2.ii.1973, leg. J. T. Medler, at light (RMNH 2405).

12 ♀, Congo [Zaïre], 25 km S. of Tshela (loc. 12), 25.vii.1957 (11 ♀) and 50 km S. of Tshela, 26.vii.1957 (1 ♀), leg. E. S. Ross & R. E. Leech (CAS; 1 ♀ slide-mounted, RMNH 2398).

7 ♀ 7 ♂, Uganda, Mpanga Forest (loc. 14), 8.ii.1969, leg. C. Lwanga, ex *Ficus* spec. ("U") (RMNH 1302; ex coll. Hill).

Variation. — There is some variation in the shape of the female head and in the number of ventral ridges on the mandibular appendage. In most specimens, the head is approximately $1^1/_3$ times as long as wide across the compound eyes, and the length of the cheek varies from almost twice to

2½ times the longitudinal diameter of the eye. In small specimens (in the present collection, those from Congo), the head is distinctly shorter (length/width ratio 7 : 6), and the cheek is shorter relative to the longitudinal diameter of the eye (7 : 5). The number of ridges is rather low in this sample from Tshela (not quite forty ridges of about 16 fine crenulations), versus the more normal number of some fifty ridges of about twenty crenulations in the other samples.

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