

A new species of *Anatoecus* Cummings (Mallophaga) from *Phoenicopterus ruber* Linn.

by

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Through the kindness of Professor K. H. VOOUS I have been able to examine a collection of Mallophaga from *Phoenicopterus ruber* made by Mr. J. ROOTH in Bonaire, Netherland Antilles. There are five species represented of which four appear to be conspecific with those found on *Phoenicopterus antiquorum* Temminck, namely: *Colpocephalum heterosoma* Piaget, 1880; *Colpocephalum salimali* Clay, 1951; *Trinoton femoratum* Piaget, 1880 (a single female only) and *Anaticola phoenicopteri* (Coinde, 1859). The fifth, a species of *Anatoecus* proves to be new. Dr. VON KÉLER (1960) has recently published an account of *Anatoecus* and in this erects two new genera, one of which, *Flamingobius*, has as type species *A. pygaspis* (Nitzsch, 1866) from *Phoenicopterus antiquorum*; the opportunity is taken here to discuss this new genus and *Cereopsoecus* Kéler, 1960 and to say why it is considered that these generic divisions are unnecessary.

Anatoecus is a distinctive genus at once separated by the characters of the head (see KÉLER, 1960 : 211), dorsal chaetotaxy of the prothorax, the presence of a mesonotal rudiment, the general characters of the male genitalia and of the terminal segments of the male and female abdomens. At present, including the new species described below, there are probably eight or nine recognizable species, two of which, *A. dentatus* (Scopoli) and *A. icterodes* (Nitzsch), are usually sympatric and have a wide distribution throughout many of the subfamilies of the Anatidae, being represented by a number of populations differing from each other to a greater or lesser extent (see KÉLER, 1960). Whether it is desirable to recognise all these populations by subspecific names or whether it is preferable to refer to them as *A. icterodes sens. lat.* and *A. dentatus sens. lat.* (see CLAY, 1962) is perhaps in many cases a matter of opinion. KÉLER (1960 : 219) in the discussion of his two new genera *Cereopsoecus* and *Flamingobius* considers the degree of development of the hypopharynx an important phylogenetic character, believing that it cannot be "present" and "absent" in closely related forms. In fact, it is never entirely absent, only less well developed, and this varying degree of development is found in a number of genera. Amongst the Amblycera, the two similar species *Austromenopon phaeopodis* (Schrank, 1802) and *A. crocatum* (Nitzsch, 1866) show considerable differences in the development of the organ (see CLAY, 1959 : 159); the same situation is found in the two similar species *Actornithophilus pustulosus* (Piaget, 1880) and *A. umbrinus* (Burmeister, 1838). In the ischnoceran genus *Ibidoecus*, CUMMINGS (1917 : 670) showed the hypopharynx might be normally developed, greatly reduced or in an intermediate stage of modification. The degree of development of this structure does not therefore appear to be of great phylogenetic importance; in fact, the mouth parts as a whole may show considerable modifications not reflected in other parts of the body, as in *Ricinus sens. lat.* parasitic on the Passeres and the Trochili (see

CLAY, 1949). It does not seem reasonable in this case to base a new family*) entirely on the characters of the mouth parts so that *Ricinus sens. lat.* is now contained in different families.

Cereopsoecus Kéler is a monotypic genus based on the species *C. clayae* Kéler parasitic on *Cereopsis novaehollandiae* Latham. It differs from *Anatoecus icterodes* in the presence of a fully developed hypopharynx and a protheca on each mandible, the presence or absence of this latter structure may be functionally connected with the degree of development of the hypopharynx; in the presence of an inwardly directed projection on the molar area of the left mandible; in the length and thickness of some of the head setae which also show sexual dimorphism, in the shorter preantennal region and the differently shaped anterior plate. The last two characters resemble those of the species of *Anatoecus* parasitic on *Cygnus*. The relative sizes of the dorsal head setae are used as a differentiating character, but it would be difficult to separate *clayae* from *A. penicillatus* by this character. The molar projection is found also in *A. penicillatus* Kéler and the species from the Phoenicopteridae. It is not considered that any of the above characters are of more than specific value.

Flamingobius Kéler, type species *A. pygaspis* (Nitzsch), differs from *A. icterodes* in the presence of a fully developed hypopharynx and protheca, the presence of a molar projection on the left mandible, the shape of the conus, the length and thickness of some of the head setae, the form of the basal segment (II) of the abdomen of which the tergal plate is undivided, the presence of two not four tergo-central setae, pleurites without anterior and posterior internal projections joining lines of thickening across the tergal plates (this character is less well-developed in some of the species from the Cygnae) and with smaller posterior ventral pleural projections, which are on pleurites II—V only. Of the other characters listed by KÉLER, 1960 : 306, the pointed anterior projection on each internal carina is also found in *A. penicillatus*; the more definite anterior delineation of the temporal carinae is also found in *A. clayae*; and the molar projection is found in other species. Another character not mentioned by Dr. KÉLER in which the species from the Phoenicopteridae differ, is the presence in the males of a pigmented area between the divided tergites II—VIII. Both "*Cereopsoecus*" and "*Flamingobius*" have the dorsal carinae continued to the base of the medial posterior prolongation of the dorsal anterior suture; similar differences in the extent of this carina are found in the species of *Saemundsonia* from the Alcidae (see CLAY, 1951 : 192).

As it is considered that the degree of development of the hypopharynx is not of phylogenetic importance there seems no grounds for erecting the monotypic genus *Cereopsoecus*. The main characters used to separate *Flamingobius* apart from those of tergum II and the pleurites, are also found in *A. clayae*, which morphologically forms a link between the species of *Anatoecus* parasitic on the swans (Cygnae) and geese (Anserinae), especially *A. penicillatus*, and those on the flamingoes (Phoenicopteridae), *Anatoecus* comprises a small number of species so that there is no added convenience in subdividing them into groups and the introduction of two

*) This family was named Trochiliphagidae by CARRIKER, 1960: 311, but the type species was given as *Trochiloecetes*, the name therefore should be *Trochiloecetidae*.

new names merely obscures the relationship between the species. As the recognition of generic divisions such as these is largely a matter of opinion it is suggested for the sake of convenience and clarity that neither *Cereopsoecus* nor *Flamingobius* should be recognized.

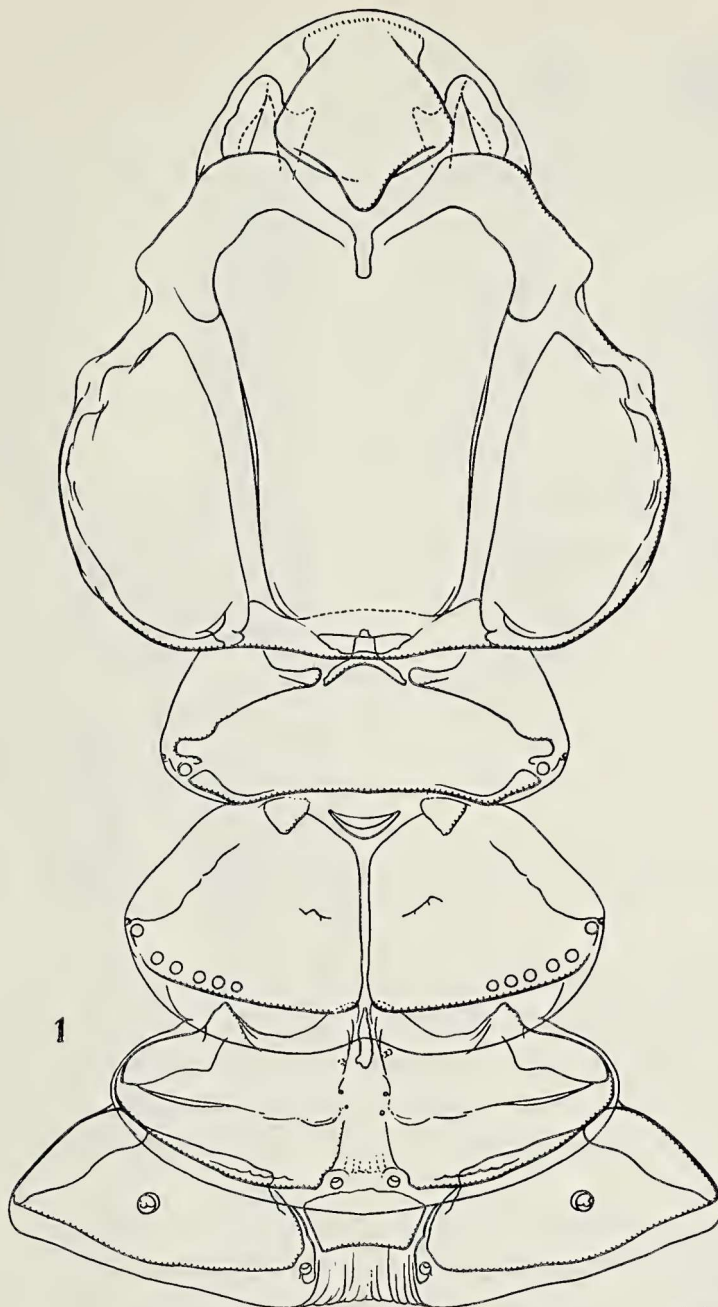
The systematic position of the Phoenicopteridae is still uncertain, so that the origin of their mallophagan fauna is also doubtful. Of the six species comprising the Phoenicopteridae as given by PETERS, 1931 (Check-list of Birds of the World), *Phoenicopterus antiquorum*, *P. ruber* and *Phoeniconaias minor* are parasitised by species of all the three genera (*Trinoton*, *Anaticola* and *Anatoecus*) common to the Phoenicopteridae and the Anseriformes; only *Anaticola* species has been taken from *Phoenicopterus chilensis*, and there are no records of any Mallophaga from the two species of *Phoenicoparrus*. If it is assumed, therefore, that the mallophagan fauna of the Phoenicopteridae is not a primary infestation derived from an ancestral stock which gave rise to the Phoenicopteridae and the Anseriformes but is secondary (see CLAY, 1950), then it was most probably acquired from the Anseriformes by the stock ancestral to the species of Phoenicopteridae listed above, if not to all the living species. The fact that the representatives of the three anseriform mallophagan genera found on the Phoenicopteridae are distinctive, both the *Anatoecus* and the *Trinoton* have been separated generically (KÉLER, 1960; EICHLER, 1941), suggests an ancient separation, although the degree of difference between species of Mallophaga is not necessarily a criterion of time of separation (CLAY, 1957). The differences between the two forms of *Struthioliperrus* found on *Struthio* and *Rhea*, probably separated at least since the Eocene, are less than those between the species of Mallophaga from the Anseriformes and the Phoenicopteridae. The characters in which the species of *Anatoecus* from the *Phoenicopteridae* resemble that from *Cereopsis*, a goose of doubtful affinities, may be primitive ones retained from the ancestral *Anatoecus* found on the primitive Anseriformes. The available information on the mallophagan fauna of the Phoenicopteridae does not provide an answer to its origin and hence that of its hosts, but suggests that it was established at least on the stock which gave rise to *Phoenicopterus* and *Phoeniconaias*.

Anatoecus kéleri sp. n.

Type host: *Phoenicopterus ruber* Linn.

This new species resembles *A. pygaspis* (Nitzsch) from *Phoenicopterus antiquorum* and is distinguished in the male by the characters of the genitalia. The available females are not in sufficiently good condition for description.

Male. — Shape of the head and anterior plate and dorsum of thorax as shown in fig. 1; other characters and chaetotaxy of head as shown in KÉLER, 1960, fig. 16 except that the dorsal setae of the head such KÉLER's numbers 7, 8, 20, 21 are more spine-like than shown, as they are also actually in *pygaspis*, although there is some individual variation. It is difficult to represent correctly the length and thickness of small setae at the magnification of most figures. Abdomen with tergite II as shown in fig. 1; tergites III—VIII separated medially with central sclerotisation; dorsum of terminal segments of abdomen as in fig. 2.

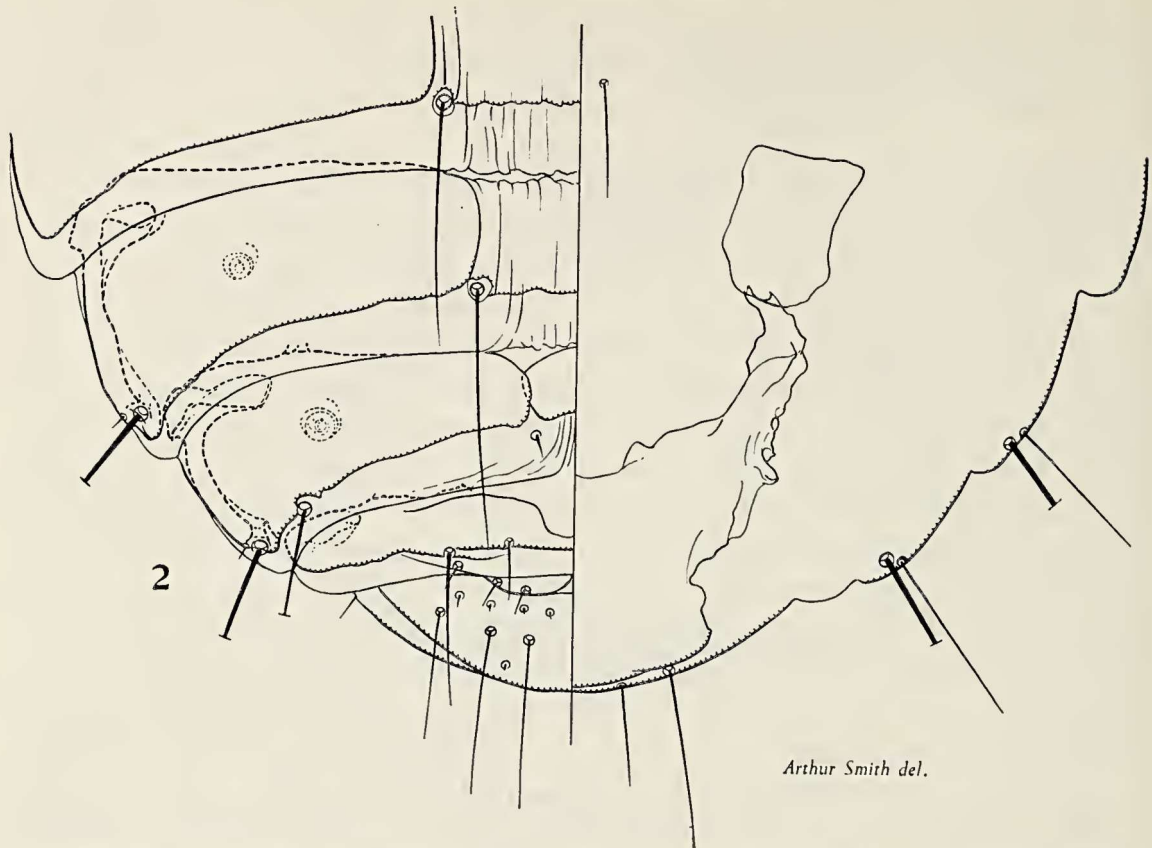


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Text-fig. 1. *Anatoecus kéleri* sp. n. Male head, thorax and first two abdominal segments, dorsal. Setae omitted.

Abdominal sternal thickening III—VI in the form of irregular indistinct patches each side; posterior segments as in fig. 2. Pleurites II—V with ventral internal posterior projections present but smaller than in other species of *Anatoecus*. Male genitalia as in figs. 3—5.

Chaetotaxy. Prothorax with chaetotaxy typical of genus; pterothorax has one spine-like and one long setae laterally and five long setae each side of the posterior margin as shown in fig. 1; one specimens lacks all the marginal setae on one side except the lateral spine-like one. The sternum of the pterothorax may have 2, 3 or 4 setae. Post-spiracular setae present only on VIII, but post-spiracular sensilli are present on segments III—V. Tergocentral setae of abdominal segments



Text-fig. 2. *Anatoecus kéleri* sp. n. Terminal segments of male abdomen. Right, ventral, left, dorsal.

II—VII, 2 long; VIII, 2 short. Pleural setae: II, 0, III, 1 spine-like seta; IV—V, 2 spine-like and 1 long setae. VI—VIII, 2 long setae, 1 medium and 1 short and fine. Sternal setae: II—V, 0; VI, 2. Chaetotaxy of terminal segments as in fig. 2.

Material examined: 12 ♂, 4 ♀ collected from the head and neck of specimens of *Phoenicopterus ruber* Linn. by Mr. J. ROOTH in Bonaire, Netherland Antilles, 1959—1960.

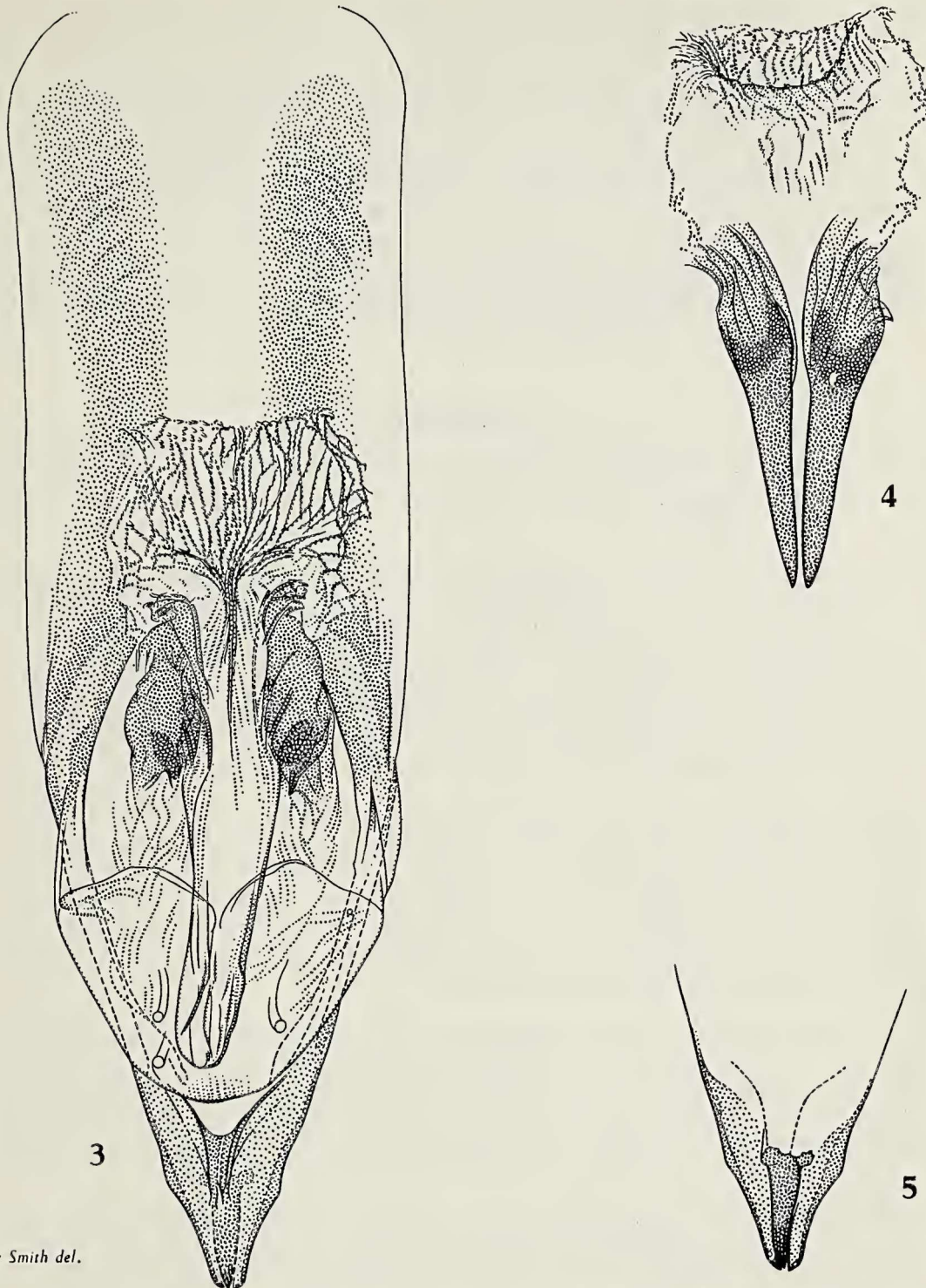
Holotype: Male in the British Museum (Natural History), slide no. 661 from *Phoenicopterus ruber* with data as given above. Paratypes: 11 ♂ from the same host species with the above data in the Zoölogisch Museum, Amsterdam and British Museum (Natural History).

Measurements in mm

	Male	
	Length	Breadth
Head	0.45	0.44
Prothorax	—	0.33
Pterothorax	—	0.35
Abdomen	0.76	0.64
Total	1.46	
Genitalia	0.53	

Measurements of heads of 7 specimens

	1	2	3	4	5	6	7
Total length in midline	0.450	0.465	0.460	0.470	0.440	0.470	0.470
Length of hyaline margin	0.110	0.130	0.125	0.120	0.115	0.125	0.125
Breadth at temples	0.440	0.465	0.460	0.455	0.420	0.450	0.460
Breadth at base of hyaline margin	0.230	0.250	0.250	0.240	0.230	0.245	0.230



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Text-figs. 3—5. Male genitalia. 3. Whole apparatus, ventral. 4. Part of sclerotisation of genital sac, dorsal. 5. Distal part of parameres, dorsal.

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Literatuur

Sakagami, Shoichi F., & Charles D. Michener, *The Nest Architecture of the Sweat Bees (Halictinae): A Comparative Study of Behavior*. University of Kansas press, Lawrence, 185 pp., 181 afb. \$ 5.00. 1962.

Dit merkwaardige boekje, samengesteld door twee auteurs die elkaar nooit hebben gezien, geeft een overzicht van onze kennis van de nestbouw van de Halictinae. De voor letterlijke vertaling niet zo geschikte Engelse naam hebben deze bijtjes gekregen omdat ze in warme klimaten de transpiratie van de menselijke huid likken. In Nederland heeft men deze dieren „groefbijen” genoemd, naar de groefachtige onderbreking in de dichte haarband op het voorlaatste achterlijfssegment van de wijfjes; er komen bij ons bijna 50 soorten voor, die men tegenwoordig tot de geslachten *Halictus* en *Lasioglossum* rekent. De groep is in enkele duizenden soorten over de gehele wereld verspreid; van ongeveer 125 soorten is de levenswijze min of meer uitvoerig onderzocht. De Halictinae nestelen als regel in de grond, waar ze cellen maken die met een mengsel van honing en stuifmeel worden gevuld; nadat er een ei op de voedselvoorraad is gelegd wordt de cel gesloten. Als studieobject is deze groep vooral van belang omdat men er allerlei overgangen in vindt van een eenvoudige solitaire levenswijze naar een gecompliceerde sociale structuur met verschillende kasten zoals die bijv. bij de hommels voorkomt.

In de inleiding worden doel en betekenis van het vergelijkend nestbouw-onderzoek besproken. De grondgedachte is hier, dat het nest het tastbare resultaat is van het bouwgedrag van de dieren, dat een studie van de verschillende nestvormen dus eigenlijk neerkomt op een vergelijkend ethologisch onderzoek en dat de resultaten hiervan een waardevolle bijdrage kunnen geven tot ons begrip van de verwantschappen en van de evolutie der milieu-aanpassingen.

Na een overzicht van de tot dusver onderzochte soorten worden behandeld: de keuze van de nestplaats, het groepsgewijs of in kolonies nestelen, de nestgangen en hun vertakkingen, de rangschikking en de bouw van de cellen, en het overwinteren. Aan een indeling van de nesttypen, in hoofdzaak gebaseerd op de ruimtelijke verdeling van de cellen ten opzichte van elkaar en van de hoofdgang, worden beschouwingen over de mogelijke evolutie van de verschillende nest-typen vastgeknoopt. Bestudering van de samenhang van de nestbouw met de systematiek van deze bijen en hun graad van sociale organisatie leidt tot de conclusie, dat in verschillende groepen de levenswijze zich onafhankelijk in de richting van sociale gemeenschappen heeft ontwikkeld. De auteurs zijn van mening, dat dit proces bij een groep in Amerika voorkomende genera een andere weg heeft gevolgd dan bij soorten der cosmopolitische genera *Lasioglossum* en *Halictus*, nl. resp. door aggregatie van solitaire individuen en door ontwikkeling van matrifiële gemeenschappen (gezelschappen bestaande uit moeder(s) en dochters). Zij wijzen er echter tevens op dat er nog zeer veel onderzoek