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Glossary of Taxonomic characters for the study of Chewing-lice

by

K. V. LAKSHMINARAYANA

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Zoological Survey of India, Calcutta
GLOSSARY OF TAXONOMIC CHARACTERS FOR THE
STUDY OF CHEWING-LICE (PTHIRAPTERA : INSECTA)

By
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FOREWORD

As in most other groups of insects, the student of Phthiraptera has also to contend with total lack of uniformity and rational concept of nomenclature of characters of taxonomic importance. The confusion is further compounded by a veritable wilderness of terms in the German, French, Russian and Polish languages. There is a most urgent need for a rational standardization of the equivalent terms. This paper eminently fulfills this need. It is more than a simple glossary of terms and discusses critically the taxonomic value of various characters. The usefulness and the value of the contribution are greatly enhanced by the inclusion of numerous illustrations. This work should prove extremely valuable to all students of Phthiraptera.


M. S. Mani
The chewing-lice variously called as ‘feather-, bird-, or biting-lice’, are ectoparasitic on birds and mammals. They are believed to have evolved from some psocopterans, or book-lice or bark-lice, about the time that birds and mammals differentiated from their reptilian ancestors. They evolved hand in hand with the host-groups and acquired host specificity in course of time. A study of the ectoparasites reflects the host relationship and its evolution. They are therefore recognized as ‘Live Indicators’ of host evolution, and the study has helped the ornithologists and mammalogists in solving some very problematic cases.

Though the lice were known from Linnaean times, yet very few have taken to the study of these interesting parasites. For most workers, though the literature in English is not difficult to follow, the very extensive literature in the German, Russian, French, or more recently Polish languages presents serious difficulties. Further, the delineation of a particular character is not always uniform, which adds to the confusion of a beginner. Though there have been attempts from time to time to standardise the same on embryological or histological bases, we still lack a comprehensive work. This paper aims in fulfilling the long-felt need for standardized nomenclature for various taxonomic characters, their equivalents in different languages. The relative significance at subordinal, family, generic, and specific levels as well as their evolutionary trend wherever possible is also outlined. Rendering it in the usual pattern of a running text will undoubtedly be monotonous to the reader especially to a beginner, therefore, it is presented in the form of a glossary to facilitate him or her in not only understanding the earlier literature with ease, but also to evaluate different characters before attempting to describe a new genus, species, and so on.

In fact, this work was originally prepared for the Anglican terms at the instance of Prof. M. S. Mani, while the author was busy with his doctoral thesis, and later improved upon by providing the vocabulary from the German, French, Russian, and Polish texts. Further, it was well checked by three eminent contemporary phthirapterologists viz., Dr. (Miss) Theresa Clay, formerly of the Department of Entomology, British Museum (Natural History), London, Prof. Dr. Wd. Eichler, Emeritus Professor of Parasitology of Museum Fiit
Naturkunde an der Humboldt Universität, Berlin, German Democratic Republic, and himself an author of a parasitology lexicon, and Prof. Dr. (Mrs.) Jadwiga Zlotorzycka, Department of Microbiology, Wroclaw University, Wroclaw, Poland, during the author's visit to their laboratories, a unique opportunity indeed. Their valuable suggestions were also incorporated, and it is hoped that it will serve the scientific public.

K. V. LAKSHMINARAYANA
TO ALL MY TEACHERS
RECORDS
OF THE
ZOOLOGICAL SURVEY OF INDIA

MISCELLANEOUS PUBLICATION
Occasional Paper

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INTRODUCTION

The Chewing-lice (Mallophaga s. l.) are dorsoventrally flattened, aperous insects, ectoparasitic on birds and mammals, with a prognathous head, sclerotized at specified areas, and often body heavily clothed with setae (incorrectly called "hairs" by some authors). They are possibly polyphyletic in origin from the book—, or bark-lice, the psocopterans, along with their cousins, the sucking-lice, which are exclusively parasitic on mammals. They are either grouped together (Aptera Linnaeus, Parasita Latreille, Anoplura Leach, Phthiraptera Haeckel sensu Weber, Anapterygota Shipley) or as separate orders (Mallophaga Nitzsch, Parasita sensu Comstock et al., Lipoptera Shipley, Ellipoptera Shipley, Anoplura auct., Siphunculata Latreille), or together associated with different related or unrelated orders of insects from time to time. For a detailed discussion on the subject attention may be drawn to Lakshminarayana (1976). Even now opinions differ whether to treat both groups of lice together or separately. Some authors following Eichler (1939) use Phthiraptera for both Mallophaga (Chewing-lice) and Anoplura or Siphunculata (sucking-lice), while others prefer to treat them separately. Clay (1970) opines that the name Mallophaga be dropped, and the three superfamilies Amblycera Kellogg (now emended to Amblycerophthirina Lakshminarayana, 1976), Ischnocera (now emended to Ischnocerophthirina Lakshminarayana, 1976), and Rhynchophthirina Ferris, which together with the sucking-lice (Siphunculata Latreille or Anoplura auct., now emended to as Siphunculophthirina) be elevated to Subordinal levels. Emerson (in litt.) however, strongly considers their treatment separately (a course generally not followed now) for his own reasons. The forms of the more common families of the chewing-lice met with in the collections of the Oriental entomologists viz., Menoponidae s. l., Boopiidae, Laemobothriidae, Ricinidae (Amblycerophthirina), Philopteridae s.l., Trichodectidae (Ischnocerophthirina), and Haematomyzidae (Rhynchophthirina) are also figured along with others for guidance (fig. 1) in this work.

Good generalized descriptions of the chewing-lice are always available in standard text-books like Essig (1942), Richards & Davies (1963, 1977), and Mani (1982), or in special monographic works like Blagoveshtchenskii (1964), Clay (1947, 1951, 1954, 1956, 1958, 1962, 1966a, 1969, 1970), Eichler (1963), Kéler (1938, 1939, 1971), Rheinwald (1968), and Zlotorzycka (1972) to quote only a few. In the descriptions of genera and species, often the terminologies used are not always uniform (particularly in the older literature) and the position is further compli-
icated in the recent descriptions in various native languages. Attempts were, however, made from time to time to standardize the terminologies as for example, Clay (1951), and Symmons (1952) for cephalic parts, Clay (1956) and Blagoveshtchenskii (1956) for the genitalia. The need for a glossary of taxonomic characters of importance as is used now, is not only desirable, but also essential to avoid confusion and to facilitate easy understanding. Therefore, the present paper aims to fulfil this lacuna.


In the discussion, the relative significance is also outlined and the original source of information is provided at the appropriate places, if it is not the author’s evaluation. The accompanying figures are mostly original, and where they are modified or taken from others, the sources are suitably acknowledged. When a character is termed differently in different languages, their equivalents are given in parentheses after the Anglican terminology, with a cross reference to others, also arranged alphabetically.

The glossary is divided into the following major sections: I. General; II. Head; III. Thorax; IV. Legs; V. Abdomen; VI. Genitalia, and VII. Chaetotaxy. Under each section, the characters are arranged in alphabetical sequence in all the languages used.

I. GENERAL

Atemlöcher : Spiracles
Chitinpanzer : Chitin armature
Chitin-shell structure
(Chitinpanzer ;
Integumentstruktur ;
pancerz oskórkory)
: The sclerotized areas of the cuticle at specified places. Recently, used for dividing the genera into groups (Zlotorzycka, 1961).
Integument-struktur : Chitin-shell structure
<table>
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<th>Term</th>
<th>Description</th>
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<tr>
<td>Microsculpture (Mikroskulptur)</td>
<td>Cell-like, comb-like, or irregular reticulations on the body wall, dorsal anterior plate, genital chamber, etc. The use of the stereoscan microscope indicates a bright scope for this character in the future taxonomic descriptions.</td>
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<tr>
<td>Mikroskulptur</td>
<td>Microsculpture.</td>
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<td>Pancerz Oskórkory</td>
<td>Chitin shell structure.</td>
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<td>Pigmentacza</td>
<td>Pigmentation</td>
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<td>Pigmentation (pigmentacza ; pigmentierung)</td>
<td>The nature or pattern of the pigmentation of the body in general sometimes serves as a useful taxonomic character as in Quadraceps s. l.</td>
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<td>Spiracles (Atemlöcher ; Spirakula ; Stigmata ; Stigmen)</td>
<td>Structure, number, and disposition of spiracles are useful taxonomic characters at higher levels, and the evolution from simple to complex forms were also traced (Harrison, 1915 ; Kéler, 1971 ; Webb, 1946).</td>
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<tr>
<td>Spirakula</td>
<td>Spiracles</td>
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<td>Stigmata</td>
<td>Spiracles</td>
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<td>Stigmen</td>
<td>Spiracles</td>
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<tr>
<td>Weisse Felder</td>
<td>White-flaps</td>
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<tr>
<td>White-flaps (Weisse Felder)</td>
<td>Recently demonstrated in Trinoton, Eureum, and Dennyus (Amblycerophthirina). In these genera, certain areas below the gular plate, thoracic sternal plates, and some of the abdominal segments appear white with a characteristic sculpture in the untreated specimens. They may be of some use in descriptions (Clay, 1969).</td>
</tr>
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II. HEAD (GLOWA : KOPF : TETE)

Ante-clypeus
Antenna (Czulki ; Fuehler ; Usiki)

: Dorsal anterior plate.
: Very useful taxonomic character.

Three (Trichodectidae), normally four (Amblycerocephthirina) and five segmented (Philopteridae, Boopidae, and Rhynchophthirina). Amongst Ischnocerophthirina, they may be sexually dimorphic (figs. 6-7), the females with simple antenna (fig. 6), and the male with an enlarged first segment with or without an appeddix (fig. 7), (Lipeurus, Goniodes, Oxylipeurus, etc.) or tuberculated seta, and the third segment may also be produced at the distal angle, or bear an appendix (pridatok 3-go chlenika usika). One of the species in a sympatric pair shows antennal variation (Clay, 1949b; Lakshminarayana & Emerson, 1971) (figs. 8-9). The antennae also appear to play a dominant part in mating in Ischnocerophthirina (Clay, 1949b). In Amblycerocephthirina, the segments are referred to as scape, pedicel and the flagellum. Variations of individual segments may be sometimes useful as generic characters (Trinoton, Hohorstiella, and Ciconiphilus).

Secondary divisions or marginal indentations also were formerly used to distinguish the genera (Cuculiphilus, Eucolpocephalum, (fig. 10) and Plegadiphilus. In some genera (Numidicola and Diectisio) all segments are equally elongated.

Antennal band (Fühlerband)
Antennal fossa (Bokovaya usikavaya yamka ; Cavite antennale ;

: Postmarginal carina.
: The cavity receiving the antenna on the underside of the head in Amblycera (fig. 5).
Führergrube; Zatoka czulkowa)

Aparat gularny : Gular plate
Area gularis : Gular plate
Auge : Eye
Balken : Trabecula
Bande laterale : Ventral carina
Bokovaya usikovaya yamka : Antennal fossa
Cavite antennale : Antennal fossa
Cephalic incrassation : Pre-antennal nodus
Cheliustnoi shupik : Maxillary palp.
Circumfasciate head (verrundeter Kopf)

Clavus : Conus
Clypeal band : Premarginal carina
Clypeal signature : Dorsal anterior plate
Conus (clavus ; klawas ; konus ; Zapfen)

Czolo
Czulki
Differentierter Kopf
Dorsal anterior plate (Ante-clypeus ; clypeal signature ; Kennmal ; nalichnikovaya plastink)

: Broad and round margined head where the sutures are not modified (Goniodes figs 1 m, 2, 7 ; Lipeurus etc. 1m) (Clay, 1951).

: A conical lateral projection of the head anterior to the antennal socket (fig. 2). Sometimes shows sexual dimorphism (Chelopistes).

: Face
: Antenna
: Specialized head

: Found in many Ischnocerophthiran genera. Formed when the marginal carina (vide infra) is interrupted by the dorsal pre-antennal suture. It may be simple, single (figs 11, 12), or divided as in Ibidoecus (fig. 13), with one or two posterior sclerotized processes which are of generic importance (Ibidoecus, Saemunds-sonio). The process may or may not have a 'gullet' and thus its form is of specific importance (Strigiphilus, fig. 12) (Clay, 1966b). The anterior rim may be straight,
Dorsal carina

(Internal bands sensu Harrison; öberer Randsaum ?)

Dorsal pre-antennal suture

Echte Trabekel

Endocarina

Epistoma

Epistome

Eyes

(Augen ; ful ; glav ; occhio ; ochiu ; oeil ; oga ; oko ; olho ; oog ; silma ; szem)

Face

(Czolo ; front ; front Stirn ; Gesicht)

Front

Front Stirn

Frontal band

Fühler

Fühler band

Fühlersaum

Ful

Gemma (Gemme)

Gemme

Gemmula

emarginated, or broadly sunk in the form of a ‘v’, and is useful in specific diagnosis.

The thickened proximal edge of the dorsal suture which may be continuous across, or turned posteriorly in the mid-line. Of generic importance.

: The dorsal part of the pre-antennal region (fig. 2, dprs), which may or may not reach the marginal carina, and may or may not interrupt, if reached. The place of origin is of generic importance (Clay, 1951).

: Trabecula

: Internal ridge-like thickening of the sclerotization of the cuticle.

: Marginal carina

: Marginal carina

: Position of eyes may be characteristic in certain genera, e.g., they are usually on the dorsolateral margin in Amblycerophthirina, but in some genera like Pseudomenopon, and Eidmanniella (in part), they are more centric (Clay, 1969).

: Division of the dorsum of the head.

: Face

: Face

: Marginal carina

: Antenna

: Antennal band

: Post-marginal carina

: Eye

: Pre-ocular nodus

: Pre-ocular nodus

: Postocular nodus
Gesicht : Face
Gesichtessaum : Marginal carina
Glasszczek szczekowy : Maxillary palp
Glav : Eye
Glotochni sklerit : Sitophore sclerite
Gorlovaya plastinka : Gular plate
Gorlovaya poloska : Occipital carina
Glowa : Head
Gular plate
(Apart gularny ; area gularis : gorlovaya plastinka ; Kehlplatte ; pole gularne Kehle)

Hinterkopf : Occiput
Hinterkopfknotten : Occipital nodus
Hyaline margin
(Hyaliner Rand ; rabek Oskórkowy ; Saeumchen)

Hyaliner Rand : Hyaline margin
Hypopharynx
(Praepharynx ; podgebie)

Inneres Kopfskelett
'Internal bands' sensu Harrison
'Internal bands' sensu Piaget
Kehlplatte

: When the marginal carina is depressed, it produces a narrow or broad hyaline rim, which may be of some specific importance in some genera (Rallicolia).


: Tentorium

: Dorsal carina

: Ventral carina

: Gular plate
Kennmal : Dorsal anterior plate  
Kiefertaster : Maxillary palp  
Klawus : Conus  
Konus : Conus  
Kopf : Head  
‘Larynx’ : Sitophore sclerite  
Lateral marginal carina (Seitliches Randband) : In certain genera (*Rallicola*), the marginal carina is interrupted medio-anteriorly to produce the lateral marginal carinae.

Lateral swellings : In the family Laemobothriidae, the pre-ocular head shows strong lateral swellings, which are absent in the family Ricinidae, and therefore, the presence or absence is of taxonomic importance.

Limbus temporalis : Marginal temporal carina  
Lingual glands : Lingual sclerites  
Lingual sclerites (Lingual glands ; Lingual sklerit ; salivary reservoirs) : Two large oval sclerites without any lumen or glandular epithelium on the posterior part of the hypopharynx (fig. 17, ls)  
Lingualskelerit : Lingual sclerites  
Lobinea poloski : Postmarginal carina  
Lori : Temporal carina  
Mandibeln : Mandibles  
Mandibles (Mandibeln ; Oberkiefer ; zuwaczki) : Aid in the separation of the sub-orders (‘superfamilies’) viz. Amblycerophthirina, Ischnocerophthirina, and Rhynchophthirina. In Amblycerophthirina, they lie in a plane parallel to the under surface of the head and articulate dorsally and ventrally. In Ischnocerophthirina, they lie vertical with anterior and posterior articulations. In Rhynchophthirina, they project out through two lateral aperutes at the tip.
of the rostrum, their teeth directed outwards as if the mandibles rotated through 180° (fig. 18), and articulate with the central wall of the head (Ferris, 1931). In certain genera (*Ricinus*, *Trochiliphagus*, and *Trockiloecetes*) they are variously modified for piercing. They also help in distinguishing *Ornithopeplechthos* from other members of the *Laemobothrium*-complex (Lakshminarayana, 1970). In *Ornithopeplechthos*, sexual dimorphism is exhibited in the mandibles; the female has normal mandibles and in the male, mandibles are as in figure 19. In the *Siphunculophthirina* they are modified for piercing and sucking.

The endocarina bordering the pre-antennal head (fig. 2, mc)

A thickened rim enclosing the temples (fig. 2 mtc)

Useful in separating Amblycerophthirina and Ischnocerophthirina. In the former (figs. 5, mp. 1 a-j) it is well developed and in the latter (figs. 1 l-q) it is absent.

Useful in the separation of Rhynchophthirina, and Trochiloecetidae in particular.

Postpalpal process

Mouthparts

Dorsal anterior plate

Marginal carina

Epistoma; epistome; frontal band; Nalichnikovaya & Perednekrainyaya-poloskii; Gesichtssaum)

Marginal temporal carina (Limbus temporalis; Schläfensaum)

Maxillary palp (Cheliustnoi shupik; glaszczek szczekowy; Kiefertaster palp)

Mouthparts (Mundwerkzeuge)

Mundhacken

Mundwerkzeuge

Nalichnikovaya plastink

Nalichnikovaya poloska

Nodi
Nodi limbales : Pre-antennal node
Nodus : Pre-antennal node
Nodus trabecularis : Pre-antennal node
Non-circumfasciate head : Specialized head with sutures obliterated as in Philopterus, and Sæmundssonia (fig. 3).
(unterbrochenrandiger Kopf)

Oberkiefer : Mandibles
Öberer Randsaum ? : Dorsal carina
Occhio : Eye
Ochiu : Eye
Occipital band : Temporal carina
Occipital carina (Gorlovaya poloska ; Trense)
(An endocarina (figs 2-3, oc) from the mandibular framework, lying posteriorly, which may or may not reach and fuse with the occipital margin (Clay, 1951). Fused hypostomal and occipital sutures according to some authors (Symmons, 1952).

Occipital nodus (Hinterkopfknoten ; Talus)

Thickened part of the marginal temporal carina on the occipital margin (fig. 2, on) : Post occipital suture according to some (Symmons, 1952).

Occiput (Hinterkopf ; potylica)
The extreme back of the head to which the cervical membranes are attached.

Oeil : Eye
Oesophageal sklerit : Sitophore sclerite.
Oga : Eye
Oko : Eye
Olho : Eye
Oog : Eye
Osulum : Apical margin of the head in front of the mouth (fig. 2, o). May be rounded, truncated, or deeply sunk when the pre-antennal marginal carinae of both sides are prolonged as in Ornithobius, Acidoproctus, Ornithopeplechthos).
Lakshminarayana : Glossary of Chewing-lice

Palp : Maxillary palp
Pars post antennalis : Post antennal region
Pars pre-antennalis : Pre-antennal region
Perednekrainyaya poloska : Marginal carina
Pharyngeal sklerit : Sitophore sclerite
Physemae : Pulvinus
Plama orbitalna : Pre-ocular notch
Podgebie : Hypopharynx
Pole gularne Kehle : Gular plate
Post antennal region (Hinterkopf Region ; pars post antennalis) : Region of the head behind the antennal socket in Ischnocerophtherina
Post antennal suture : A suture stretching across the temples or lie as two lateral sutures (Clay, 1951).

Postmarginal carina (Antennal band ; Fühlersaum ; Lobinea poloski) : Part of the marginal carina from the pre-antennal nodus to the lateral interruption of the marginal carina (fig. 11, pnm. c of Clay, 1951).

Praepharynx : Hypopharynx
Preglavnichnaya schel : Pre-ocular slit
Postocular nodus (Gemmula) : Thickened part of the marginal temporal carina behind the eye (fig. 2, pocn)
Post-ocular region : Region behind the eye
Post-palpal processes (Mundhacken) : Number and shape are useful characters for generic diagnosis in certain genera like Odoriphila, Apterygon, Heterodoxus (figs. 1 g, 20), etc., or their presence or absence may be useful for subgeneric diagnosis as in Ocuculiphilus (Carrikeria) and Ocuculiphilus (Aegypipilhus) (Scharf & Price, 1965).

Potylica : Occiput
Pre-antennal nodus : Pre-antennal nodus
Pre-antennal nodus (Cephalic incrassation; nodus limbus (pl. nodi limbales) nodus trabecularis; Prae-antennal nodus; predusikovi uzel; Vorderkopfknotten)

: A thickening of the marginal carina (fig. 2 pran) which runs inwardly and dorsally, a little anterior to the antennal socket (Clay, 1915). When more than one occur, they are sometimes referred to as nodi limbales or cephalic incrassations which may be poised symmetrically (Falcolipeurus), or asymmetrically (Struthiolipeurus) (figs. 2, 21-22, pran).

Präokularschlitz

Pre-antennal region (Pars prae-antennalis)

Predglavnichnaya schel

Predusikovi uzel

Premarkaral carina (Clypeal band; Vorderkopfrandsaum)

Pre-ocular nodus (Gemma)

Pre-ocular notch (Plama orbitalna Präokuläreinkerbung)

Pre-ocular slit (Präokulärschlitz; Predglavnichnaya schel; Vorderaugenschlitz)

Präokulärenkerbung

Pulvinarien

Pulvinus (Physemae; pulvinarien; ventral-klypeus)

: Pre-ocular slit

: Region infront of the antennal socket in Ischnocerophthirina.

: Pre-ocular slit

: Pre-antennal nodus.

: Part of the marginal carina between a lateral interruption and a medio-anterior interruption of the marginal carina (cf. fig. 11 prm. c of Clay) 1951.

: Thickened part of the marginal temporal carina in front of the eye (fig. 2, pron).

: Similar to the pre-ocular slit (vide infra) in Amblycerophthirina, but wide and with smooth margins. Useful as a generic character.

: Region infront of the eye.

: A narrow slit-like opening in the dorso-lateral part of the pre-ocular head in Amblycerophthirina. Useful in generic diagnosis.

: Pre-ocular notch

: Pulvinus

: A lobe-like unselerotized structure, believed to be a thickened clypeolabral suture (Symmons, 1962). Useful as a holdfast and aids in the
feeding. It is attached to the ventral carina, the shape of which largely depends on the pulvinus (figs. 2-3 p.). At times it is lobed (Clay, 1951; Symmons, 1952). The asymmetry in *Struthiolipeurus* appears first in the region of pulvinus (Lakshminarayana, 1973, fig. 29, 1979b).

Rabek Oskorkowy
Saeumchen
Salivary reservoirs
Scheitel
Schlafensaum
Schlafenskulptur
Schlundskelett
Seitliches Randband
Sitophore sclerite

(Slotochi sklerit; ‘Larynx’; oesophagealsklerit; Pharyngealsklerit; Schlund skelett; Sklerty gardzielowe; Zibarialboden)

Sklertyty gardzielowe
Specialized head (Differenzierter Kopf)
Silma
Szem
Talus

: Hyaline margin
: Hyaline margin
: Lingual sclerites
: Vertex
: Marginal temporal carina
: Temple sculpture
: Sitophore sclerite
: Lateral marginal carina
: Part of the hypopharynx, some times cupshaped and heavily sclerotized anterior to the mouth. In its simplest form (fig. 17), it has a pair of distal arms (a), the size and shape of which varies in different genera. The sclerite is connected with the lingual sclerites (ls), by a branched filament (cf), the arms of which traverse the anterior surface of hypopharynx, curve round the distal end of, and attached to the lingual sclerites behind. The sitophore sclerite has been used to separate the species in *Laemobothrium sens str.* (Nelson, & Price, 1965; cf. Lakshminarayana, 1970).

: Sitophore sclerite
: Non-circumfasciate head
: Eye
: Eye
: Occipital nodus
Temennia poloska
Templar sculpture
(Schlafensulptur)

Temporary carina
Typically sculptured on the temples of the members of the genus *Laemobothrion* with outer rows of peg-like projections (fig. 23)

Templeband

Temporary carina
When present, it stretches from the occipital margin across the temples to the pre-antennal nodus (fig. 2, tc), or the temporal margin above the eye. Sometimes useful in generic diagnosis.

Tentorium
(inneres Kopfskelett)

: An internal sclerotized frame-work of ectodermal origin arching on the ventral nerve cord and lying below the oesophagus. Certain muscles of the antennae, mouthparts, oesophagus, and prothoracic sternal apophyses are attached to it. In generalized insect, it consists of anterior and posterior arms, which are united medially by a cross-bar of hollow chitin called the tentorial bridge or *corpora tentorium*. In some cases, a pair of dorsal arms of non ectodermal origin are also found as out growths of the anterior arms. When present, they are directed upwards and are attached to the head capsule near the base of the hind margin of the antennal socket and the antennal muscles may be attached to them. Dorsal arms are always absent in Phthiraptera. Symmonss (1952) discussed in detail, the tentorium and its evolutionary trend in Phthiraptera. Anterior arms are complete in Amblycerophthirina, rudimentary in Ischnocerophthirina, and absent in Rhynochophthirina and Siphunculophthirina.
Likewise, the tentorial bridge is present in all Amblycerophthirina, in various degrees of reduction in Ischnocerophthirina (fig. 2, tb), and absent in Rynchophthirina and Siphunculophthirina.

Tete

Trabecula
(Balken; echte Trabekel; Trabekula)

: Head

Trabekula

Transverse carina
(Transversalkarina)

: Trabecula

: Head

Transversalkarina

Trense

Unterbrochenrandiger Kopf

Usiki

Ventral anterior plate

Ventral bands

Ventral carina
(Bande laterale; 'internal

: Transverse carina

: Occipital carina

: Non-circumfasciate head

: Antenna

: The ventral anterior plate is the counter part of the dorsal anterior plate amongst Ischnocerophthirina, with which it may fuse throughout its length or at the anterior end only (fig. 3, vap) (Clay, 1951).

: Ventral carina

: A carina continuous with the marginal carina, and the mandibular
bands' *sensu* Piaget; ventral bands; zygoma)

framework and to which the pulvinus is attached (figs 2-3, vc). It may be semicircular, or interrupted medially by a pre-antennal suture, the edges of the latter are sometimes thickened. The shape of the ventral carina is partly depended on the pulvinus (Clay, 1951).

Ventral carina
Ventral Klypeus
Verrundeter Kopf
Vertex (Scheitel)
Vorderaugenschlitz
Vorderkopfknoten
Vorderkopfrandaum
Zapfen
Zibarialboden
Zaloka Czúlkowa
Zügel
Zuwaczki
Zygoma

III. THORAX (*BRUSTABSCHNITT*: TULOW)

Brustabschnitt: Thorax
Brustplatten: Sternal plates
Hinterbrust: Metathorax
Meso-metathorax: Pterothorax
Mesothorax: Second or middle thoracic segment. Sometimes ring-like, useful in generic diagnosis (*Myrsidea*); at times fused with prothorax (Phila-ndesia), but generally fused with metathorax to form pterothorax in Ischnocerophthirina.
LAKSHMINARAYANA: Glossary of Chewing-lice

Metathorax
(Hinterbrust; Zaluow)

: The third or last thoracic segment. Meso-and meta-nota may be fused together (*Harrisonia*) (cf. Pterothorax).

Mittelbrust

: Mesothorax

Prothorax
(Ptzedtulow; Vorderbrust)

: First thoracic segment. Sometimes fused with mesothorax (*vide supra*).

Pterotoraks

: Pterothorax

Pterothorax
(Mesometathorax; Pterotoraks; Perotoraksen)

: In the Ischnocerophthirina, generally the meso-metathoracic segments are fused to form the pterothorax.

Pterotorakesen

Ptykisternalne

Ptzedtulow

Srodtulow

Sternal plates
(Brustplatten; Ptyki Sternalne; Sternal platten; Sternum)

: Sternal plates

Sternal platten
Sternum

Thorax
(Brustabschnitt; tulow)

: Serves as a good taxonomic character as a whole to separate the three suborders. Prothorax well developed; meso-metathorax separate in Amblycerophthirina in general, and usually fused together in Ischnocerophthirina. The thoracic segmentation is not apparent in Rhynchophthirina due to obliteration of the sutures. As stated
above, mesothorax ring-like in some members of the Menoponidae (Amblycerophthirina), hence of generic importance (*Myrsidea*). Mesonotum fused with prontum (*Trimenopon, Cummingsia*), with metanotum (*Harrisonia*) or free (*Philandesia*) within the family Trimenoponidae (Clay, 1969; Kéler, 1971).

Transverse carina of the Prothorax (Vorder brustquerband) : In all Amblycerophthirina (except *Rediella*) a transverse carina is evident (fig. 4, t).

Tulow : Thorax

Vorderbrust : Prothorax

Vorderbrustquerband : Transverse carina of Prothorax.

Zatulow : Metathorax

**IV. LEGS (Beine; Odnoza; Pattes)**

Beine : Legs

Claws (Krallen; Pazurek) : May be single (Gyropidae, Trichodectidae (1, i, l; 26), and Rhynchoptirina, double in all other families or absent in some legs (Gyropidae), and thus useful for family separation. Shape of the claws are diagnostic in certain genera (*Bonomiella*, fig. 27, and *Microctenia*).

Empodium (Ostroga; Sohle ?) : On the ventral part of unguitractor (*vide infra*) on the middle and hind-legs, a hyaline, sometimes a tuberculate process is evident in many genera and species of Menoponidae. It may be fan-shaped, not apparent or even absent. It may be useful as a generic character.
Euplantula I & II
(Euplantula I: Schlenlappen; Euplantula II: Haftlappchen; Pulvillen)

Femur
Oberschenkel; Udo)

Fuss
Fussteil
Golen
Haftlappchen
Kralle
Krallenzicher

Legs
(Beine; Odnoza, Pattes)
Oberchenkel
Odnoza
Ostroga
Pattes
Pazurek

A pad-like lobe on the first tarsal segment distal to a pair of setae and with characteristic striations (Kéler, 1952; Clay, 1966a, 1969). It may serve as a good taxonomic character. The Euplantula II on the second tarsal segment, is similar to the first, or sometimes very much elongated to nearly half the size of the tarsus.

The femur in Amblycerophthirina is generally large particularly the hind one, which offers characters of taxonomic importance. It may carry a setal ‘Brush’ or ‘combs’ or ‘Ctenidia’ (figs. 28-29) on its venter. In addition, it may carry comb-like outgrowths. The presence, nature, and number of setae in a brush or ctenidia as a whole are useful in generic and specific diagnosis. Spiniform setae on the proximo-dorsal aspect of the second femur in Laemobothrium sens. str., are of specific importance (Nelson & Price, 1965).

Tarsus
Tarsus
Tibia
Euplantula II
Claws
Unguictractor

Composed of coxa, trochanter, femur, tibia, tarsi as in other insects

Femur
Legs
Empodium
Legs
Claws
Pulveiln : Euplantula  
Schiene : Tibia  
Schienbein : Tibia  
Sohle ? : Empodium  
Sohlenlappen : Euplantula I  
Stopy : Tarsus  
Streckplatte : Unguitractor  

Tarsus : May be normal, one or two-segmented, or modified as claspers (Gyropidae) and thus useful for family separation.  
(Fuss ; Fussteil ; Stopy)  

Tibia : The thumb-like structure on the tibia (fig. 25) in the family Trichodectidae (Damalinia), tibial spurs in some (male of Piagetiella), and the fine rows of setae on the anterior marginal or submarginal setae on it (Heleonomus) are good taxonomic characters.  
(Golden ; Schiene ; Schienbein ; Unterschenkel)  

Udo : Femur  

Unguitractor : In Amblycerophthirina, the unguiteractor appears as two plates to which a tendon like apodeme of retractor muscle of the claws is attached. The shape of this organ may proves to be a useful character in taxonomy (Clay, 1969).  
(Krallenzieher ; Streckplatte)  

Unterschenkel : Tibia  

V. *ABDOMEN* (Abdomine ; altest ; bakkropp ; brichio ; buik ; Hinterleib ; odulok ; podbrzusse oduzok ; takaruumis)  

Abdomine : Abdomen  
altest : Abdomen  
Abdomen : Oval, nearly circular, sometimes
<table>
<thead>
<tr>
<th>Term</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdomin; altest; bakkropp; brichio; buik; Hinterleib; odulok; podbrzusse oduzok; takaruumis</td>
<td>Tapering, or elongated, and parallel-sided, generally longer and often wider than head and thorax. Normally 8-10 segmented. Often the anterior segment may fuse with metathorax and the apparent segment is in fact, the second one. The shape of the abdomen is dependent on the occupying niche on the host body. The bird head inhabiting forms are usually with broad abdomen, while the wing and abdomen inhabiting forms are with long and slender abdomen so that they escape being rubbed off in preening. When a head inhabiting form occupies an empty ecological niche on the wings, the body is elongated secondarily as in <em>Columbicola</em> and <em>vice versa</em> (Clay, 1949b).</td>
</tr>
<tr>
<td>After</td>
<td>Anus</td>
</tr>
<tr>
<td>altest</td>
<td>Abdomen</td>
</tr>
<tr>
<td>Analseitenfortsätze</td>
<td>Latero-anal processes</td>
</tr>
<tr>
<td>Anus</td>
<td>May be terminal, dorsal, or ventral. Useful in distinguishing certain genera. It may be oval, v-shaped, or w-shaped in some like <em>Colpocephalum</em> (fig. 30)</td>
</tr>
<tr>
<td>(After)</td>
<td></td>
</tr>
<tr>
<td>Bakkropp</td>
<td>Abdomen</td>
</tr>
<tr>
<td>Bauchplatten ?</td>
<td>Sternites</td>
</tr>
<tr>
<td>Brichio</td>
<td>Abdomen</td>
</tr>
<tr>
<td>Buik</td>
<td>Abdomen</td>
</tr>
<tr>
<td>Crop-teeth</td>
<td>Gastric teeth</td>
</tr>
<tr>
<td>Ctenidie gastrique</td>
<td>Gastric teeth</td>
</tr>
<tr>
<td>Gastric teeth</td>
<td>A chitinous organ present in the alimentary canal. Used as a taxonomic character in olden days (Cummings, 1913).</td>
</tr>
<tr>
<td>(Crop-teeth; ctenidie gastrique; Kropfzähne; Magenfzähne; ProventrikuIuszähne; )</td>
<td></td>
</tr>
<tr>
<td>Hinterleib</td>
<td>Abdomen</td>
</tr>
</tbody>
</table>
Sometimes sclerotized plates are present in certain genera (*Otidoecus*) between segments II-VII.

Intertergal plates
(Intertergalplatten ;
Meztergalnaya plastink)

Intertergal plates
Latero-anal processes
(Analseitenfortsätze)

Processes may be present laterad to the anus, which are constant in certain genera (*Turacoeca, Chapinia, etc.*)

Kropfzähne
Magenzähne
Meztergalnaya plastink
Odulok
Paratergites
Pleuralnica plastinki

Gastric teeth
Gastric teeth
Intertergal plates
Abdomen
Pleurites
Pleurites

Pleurites
(Paratergites ; pleiralnica plastinki ; pleury ; Seitenplatten)

May appear as simple plates, (fig. 1b), slenderslats (*Nigronirmus*), with complicated re-entrant head (*Goniodes, Campanulotes, etc.*), with anterior perforation (*Syrrhaptocoeus*), or fused with tergites (*Piagettiella*), with posteroverentral angles produced into spiniform processes (*Pseudomenopon, Plegadiophilus, Hohorстиella, etc.*), or posterolaterally produced (*Kelerimenopon*), or with wedge-shaped processes (*Anatoecus*). Thus, they may be of generic or specific importance.

Pleury
Podbrzusse oduzok
Proventrikuluszähne
Rücken platten
Seitenplatten

Pleurites
Abdomen
Gastric teeth
Tergites
Pleurites

May be entire (fig. 1b), plate-like, or divided into median and lateral lobes. Sternite I apparent in many Amblycerophthirina (not in *Oculliphilus* for ex.). VII may be fused
wholly or partly with the following to form a subgenital plate, the shape of which is variable, and a useful taxonomic character. The subgenital plate, may carry a thorn-like process (as in *Oxylepeurus*-complex fig. 31,s). Rarely sexually dimorphic (as in males of *Franciscoloa* (*Caca-menopon*) (Price, 1968) and *Holomenopon goliath* (Clay) (cf. Clay, 1961).

**Sternity**
- **Tergalnica plastinki**
- **Tergites** (Rückenplatten; Tergalnica plastinki; tergity)

May be plate-like, entire (fig. 1b), or divided. Tergite I absent in Ischnocerophthirina. Sexual dimorphism is exhibited in some Amblycerophthirina (*Myrsidea*) and useful in specific diagnosis.

**Tergity**
: Tergites

### IV. GENITALIA

Offer very useful taxonomic characters. For details, Blagoveshtchenskii (1956), Clay (1956), Eichler (1963), Kéler (1971) are recommended for consultation.

**Accessory copulatory organs** (Hilfskopulations organe)
: Usually rare, but sometimes the subgenital plate may carry a tube or rod-like process as in *Oxylepeurus*-complex (fit. 38, s; vide supra abdominal sternites).

**Aedeagus** (Aedoeagus)
: A term used for the entire genital apparatus by some, and genital sac and its associated sclerites by others.

**Aedoeagus**
: Aedeagus

**Antedorsal endomere** (Hintere Endomere)
: An unpaired sclerite similar to lower endomere (Clay, 1956).

**Appendices externes**
: Parameres
Asymmetry in genitalia (Genitalasymmetrie)

As a rule, the genitalia are poised symmetrically (figs. 32, 33, 36, 38), but in certain genera (Trinoton, Eomenopon, Pacifimenopon), and in some species (Goniodes parviceps (Piaget) (fig. 34), and Holomenopon goliath (Clay), they are asymmetrical, and thus useful as generic and specific separation. It is probable that, one of the sympatric species may develop the asymmetry during speciation as in Goniodes mayuri (Lakshminarayana & Emerson), and its sympatric pair Goniodes parviceps (Piaget) (figs. 33-34). (vide Lakshminarayana & Emerson, 1971, 1978; Lakshminarayana, 1979 a, b).

Basal apodeme (Basalleiste)

A rod-like apodeme (figs. 36, 38, ba) in Amblycerophthirina corresponding to the basal plate in Ischnocerophthirina (vide infra).

Basal plate (Basalplatte; Bazahnaya plastinka; plaque basale; ptytka podstawowa)

A large plate-like structure articulating with the genital sac and extending anteriorly into the abdomen (fig. 32, bp). Sometimes carry either horizontal (Saemundssonia), or longitudinal (Strigiphilus) carinae and their presence or absence, and shape, are useful characters of specific importance.

Basalplatte
Basalleiste
Bazahnaya plastink
Begattungsglied
Calyx
Eikelch

Basal plate
Basal apodeme
Basal plate
Penis
Modified area of the female spermatheca at the junction of the sac and the tube (Clay, 1956; Waterston)

Eikelch

Calyx
<table>
<thead>
<tr>
<th>Term</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eilegescheiden</td>
<td>Gonoapophyses</td>
</tr>
<tr>
<td>Eizangen</td>
<td>Gonoapophysis</td>
</tr>
<tr>
<td>Endomeral plate (Endomeralplatte; Plaque endomerale)</td>
<td>Dorsally fused plate of the two endomeres (<em>vide infra</em>), the shape of which may be a useful specific character (<em>Degeeriella</em>, fig. 35) (Clay, 1968)</td>
</tr>
<tr>
<td>Endomeral platte</td>
<td>Endomeral plate</td>
</tr>
<tr>
<td>Endomeren</td>
<td>Endomeres.</td>
</tr>
<tr>
<td>Endomeres (Endomeren; Endomery)</td>
<td>Paired sclerotization of the genital sac lying within or dorsal to the parameres (fig. 32, e). The nature of the endomeres was found very useful in separating some genera in the <em>Laemobothrion</em>-complex (1968, 1970).</td>
</tr>
<tr>
<td>Endomery</td>
<td>Endomeres</td>
</tr>
<tr>
<td>Endothere</td>
<td>Genital sac</td>
</tr>
<tr>
<td>Genital chamber (Genitalhoehle (beim ♂)</td>
<td>Structures associated with female genital chamber serve as useful characters of taxonomic importance (<em>Mimemenopon, Eomenopon, Pacificmenopon</em>).</td>
</tr>
<tr>
<td>Genitalkammer (Beim ♀)</td>
<td>Genital chamber ♀</td>
</tr>
<tr>
<td>Genitalhoehle</td>
<td>Genital chamber ♂</td>
</tr>
<tr>
<td>Genitalkammer</td>
<td>Genital chamber ♀</td>
</tr>
<tr>
<td>Genital reticulation and striations (Genitalskulpturierung)</td>
<td>Reticulation seen on the wall of the genital chamber (<em>Colpocephalum tausi</em> (Ansari), or striations associated with it (<em>Goniodes meinertzhaegeni</em> Clay, fig. 40) serve as useful characters of taxonomic importance.</td>
</tr>
<tr>
<td>Genital Sac (Endothere; Genitalsack; vipyachenmi praputialni meshok; worek prepucjalny)</td>
<td>An eversible sac bearing the gonopore in the male, the walls of which are either sclerotized or provided with spiniform processes (fig. 33, gs). (cf. Clay, 1956).</td>
</tr>
<tr>
<td>Genitalsack</td>
<td>Genital sac</td>
</tr>
</tbody>
</table>
Genital sclerite: The genital sclerite is a very useful taxonomic character particularly in certain genera of Amblycero-
phthirina (Copolophalus, figs 36-37), (Myrsidea, figs 38-39). It is also useful in certain Ischnocerophthirina (Degeeriella fig. 35).

Genital asymmetry: Asymmetry in genitalic

Genital platte: Subgenital plate

Genital skulpturierung: Genital reticulation and striation

Genital skulpturierung: Genital sclerite

Gonapophyses: Gonapophyses

Gonapophyses: A pair of apically free lobes in the female, the mesal margins of which are continuous with the anterior margin of the vulva, and at times carry an ampulla (Vamalinia, fig. 41)

Hamulae: Gonapophyses

Hilfskopulations organe: Accessory copulatory organs

Hinter Endomere: Anterodorsal endomere

Hypandrium: Subgenital plate ♂

Hypogynium: Subgenital plate ♀

Hypomere: An unpaired sclerite of the genital sac ventral to the penis (fig. 32 hm) (Clay, 1956).

Internal genital sclerite of the female: An internal sclerite of the female genital chamber

Kopulationsklappen: Gonoapophyses

Lower endomere (Untere Endomere): Unpaired endomeral sclerite ventral to and between the base of the parameres (Clay, 1956).

Mesosom: Mesosome

Mesosomalplatte: Mesosome
Mesosome: When the genital sac is absent, the different components of the sclerotized genital sac are referred to as mesosome (Saemundssonia, Brueelia, etc.).

Mesosome
(Mesosom; Mesosomalplatte; Mezozoma; ptytka Mezosomalna)

Mesozoma: Mesosome

Parameres: Paired sclerites articulating with the posterolateral angles of the basal plate or apodeme (fig. 32, pm), free, or fused Laemobothrion-complex) or provided with a beakshaped head (ex. Saemundssonia). Taxonomically very important.

(Appendices externes; Parameren; Paramen; Paramery)

Parameri: Parameres

Parameren: Parameres

Paramery: Parameres

Penial arms: Curved arms at the junction of the penial sclerite, basal apodeme, or plate, and penis (Clay, 1958), the form of which is a useful taxonomic character (Degeeriello, fig. 35), the presence or absence is of specific importance (Clay, 1958).

Penis
(Begattungsglied; Pracie)

Penis: The distal part of the genital sac surrounding the male gonopore, which is prolonged into a tubular precess (fig. 32, p.)

Plaque basale: Basal plate

Plaque endomeral: Endomeral plate

Post-vulval sclerites
(Sub-vulval sclerites)

: Originally referred to as subvulval sclerites (Clay, 1968). A pair of sclerites on the dorsal wall of the genital chamber (probably the sclerites of segments IX-X, X alone) (Dhanda, 1961) (fig. 42)

Pracie: Penis

Ptytka podstawowa: Basal plate
Ptytka mezosomalna | : Mesosome
Raife | : Gonoapophyses
Rezeptakulam seminis | : Spermatheca
Saemenkapsel | : Spermatheca
Spermatheca (Rezeptakulum seminis : Samenkapsel ; Spermatheke) | : Usually single somtime bilobed, thin walled sac, with a fine, weakly sclerotized tube opening on the dorsal wall of the genital chamber.
Spermathekae | : Spermatheca
Subgenital plate | : One arm of the sternal plants lying anterior to the genital opening may be well sclerotized, and often fused to form this plate (Clay, 1956, 1970).
(Subhypandrium♂ ; Hypogynium♀ Genitalplatte ; Subgenitalplatte) | :
Subgenitallappen | : Subgenital process
Subgenitalmittelappen | : Subgenital process
Subgenital process (Subgenitallappen ; subgenitalmittelappen, verlängerter Pfortlappen) | : In certain genera like *Oxylipeurus* complex (fig. 31, s), the subgenital plate may be prolonged into a tube or rod.
Sub-vulval sclerites | : Post-vulval sclerites
Telemeren | : Telomeres
Telomeres (Telomeren ; Telomery) | : Paired sclerites of the genital sac either side of the penis (fig. 32, te).
Telomery | : Telomeres
Untere Endomere | : Lower endomere
Ventral endomeral plate | : A ventral counterpart of the dorsal endomeral plate lying ventral to the penis (Clay, 1956).
Verlängerter Pfortlappen | : Subgenital process
Vipyachenni praputsialni meshok | : Genital sac
Worek prapucjalny | : Genital sac.
VII. CHAETOTAXY (BEBORSTUNG; BORSTENKLIED)

Setae are usually employed as a good taxonomic character in separating the genera and species. However, caution must be exercised in delineating new species on the basis of chaetotaxy alone, as often large variations in the number and length of setae are normally encountered in large populations. Seta is a hollow extension of exocuticle and produced by a single trichogen cell and arise from a cuplike pit or alveolus. The more important setae alone are discussed here following after the recent works. Several authors, notably Clay (1947, 1951, 1954, 1962a, 1969, 1970), and Elbel (1967) discussed this aspect in greater detail, and for a fuller understanding, attention is invited to these contributions. The dorsal head sensillae and the associated setae are also referred to here (figs. 2, 4, 5).

Anal corona

Anal fringe
(Anal corona; Analkranz; Analkrone; Wieniec analny)

Analkranz
Analkrone

Antennal Seta

Anterior mesonotal setae (Praemesonotalborsten)

Anterior tergal setae

Asters
(Stachelhuegel; Stachelstern)

Anal corona

Anal fringe
A fine row of setae surrounding the anus on the tenth abdominal segment in Amblycerophthirina. May be typical, or atypical.

Analkranz

Anal fringe

Analkrone

Anal fringe

Antennal Seta

: The first segment of an Ischnocerophthiran antenna may bear a sensory seta, which is fine. It may be lance shaped as in (Goniodes mayuri) (Lakshminarayana & Emerson 1971) or long and fine in the other member, Goniodes parviceps (Piaget), of the sympatric pair.

: Generally four setae are located near the distal end of the postnotum on the mesonotum in Amblycerophthirina. Their number and position are costant with in a genus (Clay, 1969).

: Tergal setae

: A group of setae borne on a tubercle and modified into spiniform processes as on the sternite II (Myrsidea, fig. 43, as), sternite VI
Augenborsten
Beborstung
Borsten des Clayschenorgan
Borsten fleck
Borstenkleid
Bristle Stachel
Brush
(Borstenfleck)

Claysche Bueschelborsten
Combs
(Ctenidia ; Pseudoctenidien ; Stachelkaemme)

(Franciscologia (Cacamenopon)). They may occur in a single group on either side as in the former genus, or in two groups on one side only as in the latter. The variations in these setae have prompted some authors to erect new genera (Zlotorzycka, 1964), and not accepted by others (Clay, 1966a). The exact function of the tubercle, or the associated setae is, however, not known, but possibly connected with production or perception of pheromones or sex associated hormones (?)

Ocular setae
Chaetotaxy
Spatulate setae
Brush
Chaetotaxy
A sclerotized seta

Concentration of setae which may be small, scattered, or closely set as on the venter of the hind femur (figs. 28), and certain of the abdominal sternites in Amblycerophthirina. Of generic importance. The number and disposition have also been used as characters of specific importance.

Spatulate setae
A row short, stout setae with alveoli lying close together and approximately poised in a straight line as is found on the venter of the hind femur (fig. 29), and on the posterolateral angles of some of the abdominal sternites in Amblycerophthirina. Of generic importance, on the basis of presence, or absence. If
<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ctenidia</td>
<td>present, the number of comb rows, complete or incomplete (partial comb row), and disposition are useful specific characters.</td>
</tr>
<tr>
<td>Dornen</td>
<td>: Combs</td>
</tr>
<tr>
<td>Dornenförmige Borsten</td>
<td>: Spines</td>
</tr>
<tr>
<td>Dorsal head sensillae</td>
<td>: In all five (fig. 4, a-e), but normally three are present in Monoponidae. The presence or absence of these sensillae are of generic and specific value. The sensillum a is anterior to seta 9, b posterior to 9, c near 14 and 15, d and e near 16 and 17 respectively. The last two sensillae may or may not be always present and is a group character (Clay, 1969). Position of the sensillae and the associated setae on the antennae are also useful taxonomic characters.</td>
</tr>
<tr>
<td>(Dorsale Kopfsinneshaaare)</td>
<td></td>
</tr>
<tr>
<td>Dorsal head setae</td>
<td>: The dorsal head setae are serially numbered 1-31 (Clay, 1969), and are dealt with under seta I, etc.</td>
</tr>
<tr>
<td>(Dorsale Kopfborstuen)</td>
<td></td>
</tr>
<tr>
<td>Dorsal setae <em>sensu</em> Price &amp; Beer (1963)</td>
<td>: Setae 14-16</td>
</tr>
<tr>
<td>Dorsale Kopfborstuen</td>
<td>: Dorsal head setae</td>
</tr>
<tr>
<td>Dorsale Kopfssinaare</td>
<td>: Dorsal head sensillae</td>
</tr>
<tr>
<td>Erste Schlaefenborstuen</td>
<td>: First temporal seta.</td>
</tr>
<tr>
<td>First temporal seta</td>
<td>: The temples bear a number of long and short setae on the margins. The locations, of the first is a useful taxonomic character, which normally arises a little below the eye, but in <em>Saemundssonia</em>, it arises on the ventral surface of the lens.</td>
</tr>
<tr>
<td>(Erste Schlaefenborstuen)</td>
<td></td>
</tr>
<tr>
<td>Gular setae</td>
<td>: The number is useful in specific diagnosis.</td>
</tr>
<tr>
<td>(Kehlborstuen)</td>
<td></td>
</tr>
<tr>
<td>'Haar'</td>
<td>: ‘Hair’</td>
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</table>
'Hair' ('Haar')
Hinterkopf borsten
Hinterschlaefenborsten
Inner dorsolateral setae
Kehl borsten
Kiefertaster birstchen
Kliny twarzowa
Kolec
Kurzborsten
Labialpalpenbirstchen
Labial palpal setae (Labialpalpenbirstchen)
Labral setae (Oberlippenbirstchen)
Marginal metathoracic setae (Metalateralborsten)
Marginal prothoracic setae (Prothoraxseitenborsten)

: A term used in older literature—a misnomer for seta (vide infra)
: Occipital setae
: Posterior marginal temporal setae.
: A row of fine inner dorsolateral setae are present in the genus Ancistrona and not encountered in any other Amblycerophthiran genus, and therefore, useful in the diagnosis of the genus (Clay, 1969).
: Gular setae
: Maxillary palpal setae
: Sclerotized processes
: Bristle
: Microchaetae
: Labial palpal setae
: Presence or absence and number are useful family, and subfamily character of taxonomic importance in Amblycerophthrina. Usually four or five setae on the apical segment of the palp (Menoponidae, Boopidae, Gyropidae partim, viz., Gyropinae and Protygropinae, four (Trimenoponidae), three (Gyropidae partim, Gliricolinae) are present or absent (Ricinidae) consequent to the loss of labial palp.
: Present in two rows. The anterior one with shorter setae of 1, 3, 6, 7, and remainder longer and a posterior row of closely set setae.
: A row of setae on the margin of metathorax.
: The prothoracic margin bears a number of setae (fig. 4, m. p. s.), which are variable in different species. The seta 5 occasionally
Marginal tergal setae
of the abdomen (Tergolaterale Borsten)

Maxillary palpal setae
(Kiefertasterbörstchen)

Mesonotal setae
(Mesonotalborste)

Mesosomal setae
(Mesosomalborsten)

Mesosomalborsten
Metalateralborsten
Metathorakalborsten
Microchaetae
(Kurzborsten ; Microchaeten ; rzeska)

Microtrichia (Microchaetae)
Mid-dorsal head setae
(Scheitelborsten)

either long and stout or short and fine, hence useful in specific diagnosis.


: Two setae are usually found sub-marginally on the apical segment of the maxillary palp. The presence, or absence, nature, relative length, contiguity, or separation of the alveoli if present, are useful characters at family level. They are present with one of them peg-like in Menoponidae, Boopiidae, and Laemobothriidae and absent in Ricinidae (Clay, 1970). The nature and relative length of the setae, contiguity or separation of the alveoli are useful characters at specific level (Clay, 1968, 1969, 1970).

: A setae found on a protruberance laterally on the mesonotum of all Boopiidae, and not found anywhere else (Clay, 1970).

: The arrangement of mesosomal setae is of specific importance atleast in Saemundssonia parasitic on sterninae.

: Mesosomal setae

: Marginal metathoracic setae

: Pterothoracic setae

: Small setae without any basal articulation, thus distinct from true minute setae with basal articulations. Also known as Microtrichia.

: Microchaetae (vide supra)

: Setae 17, 18 (vide infra)
Mid-mesosternal setae

Sometimes referred to as central mesosternal setae in Amblycercophthirina. Generally four or more, and the number is constant within a genus. Occasionally less than four, for ex., two in *Austromenopon* (Clay, 1969).

Mid-metanotal setae

(Zentralmetanotal borsten)

Generally many central metanotal setae are present, which are referred to these setae. These setae are of specific importance only (*Actornithophilus*).

Mikrochaeten

Microchaetae

Modified head setae

Some of the head setae may be modified viz., spiniform (*Anatoecus*, fig. 44), flattened third anterior seta (*Columbicola*, fig. 45) stout second anterior setae (*Anaticola*) (Clay, 1951), peglike or spatulate (*Eulaemobothrion, Ornithopeplechthos, Ciconiocola*) (Lakshminarayana, 1968, 1970) (fig. 46) are of generic importance.

Mundhacken

Selerotized processes

Oberlippenbörsten

Labral setae

Occipital setae

Setae 21-22.

(Augenborsten)

Setae 19-20

Outer dorsal tibial setae

The number of these setae are of specific importance in certain genera (*Actornithophilus, Myrsidea*, etc.) (Clay, 1962, 1966 a).

Pattern A

In some species of *Actornithophilus* (Clay, 1962) found two typical patterns viz., Pattern A and A 1. In Pattern A 1, the marginal setae on abdominal tergites are arranged from the lateral margin inwards as follows: long, stout post spiracular seta (*vide infra*), and a stout seta,
and in between these two setae which lie at each end, a row of six tergocentral setae.

Pattern A I

: In Pattern A I (vide supra) on tergite VIII, only four tergocentral setae are present instead of six.

Pleural setae

: Useful taxonomically. Found on the pleurites.

Posterior marginal temporal setae

(Hinterschafenborsten)

: Setae found on the posterior margin of the temples are useful taxonomically.

Postmental borsten

Postmental setae

(Postmentalborsten)

: Postmental setae

: Usually four setae each side are found in Amblycerophthirina (fig. 5, m).

Post-spiracular setae

(Postspirakularborsten)

: The post-spiracular seta lies posterior to the spiracle as the name indicates, and associated with two small setae, the alveoli of which are contiguous with that of the post-spiracular seta. In Amblycerophthirina, these setae are apparent on segments III-VIII of the abdomen. Similar three setae are present on II also, though no functional spiracles are present on it. In certain genera (Somaphantus), the postspiracular seta lies in the same row as that of marginal row. In the Ischnocerophthirina the adjacent sensilli are absent and in Rallicola, it is a good generic character. In Goniodes, no adjacent sensilli are found as in all other Ischnocerophthirina. The post-spiracular setae may be absent, in some or all the segments or two to three may be present or mixed with the tergal setae. On segment VIII, a lateral seta is present lying in a pocket in the Ischnocerophthirina.
In Boopiidae (except *Paraboopia* and *Latumcephalum*) they are located within the alveoli of the trichobothria on segments II-IV (Clay, 1969). Thus, the number and disposition of the setae and associated sensilli are useful taxonomic characters.

Postspirakularborsten : Postspiracular setae
Praementalborsten : Premental setae
Pramesonotalborsten : Anterior mesonotal setae
Praeocularborsten : Pre-ocular setae
Pre-mental setae : The number of these setae is constant. The length of one of the setae is used as a good group character at least in one genus (*Actornithophilus*) (Clay, 1962).

Pre-ocular setae : In Amblycerophthirina, the relative lengths of the pre-ocular setae 10 and 11 are used as generic (*Meroomenopon*), and specific (*Actornithophilus*) characters.

Pronotal borsten : Pronotal setae
Pronotal setae : Usually two pairs of central pronotal setae (fig. 4, dps) are present near the transverse carina (t) dorsally and their number and length may be of specific importance in Amblycerophthirina.

Prosternal setae : Usually two setae are found in Amblycerophthirina. Additional setae may be of generic importance.

Prothoraxseitenborsten : Marginal prothoracic setae
Pseudoktenidia : Combs
Pseudoktenidien : Combs
Pterothoracic setae : In Ischnocerophthirina, a group of setae in single, or paired groups with fused or separate alveoli occur dorsally on the pterothoracic post-
Lakshminarayana: Glossary of Chewing-lice

Rzeska
Scheitelborsten
Schlafenborsten
Sclerotized processes (Mundhacken; Kliny twarzowe)

Seta (Borste; Szczecinka)

Head setae
Seta 1 (fig. 4)

erior! margin on either side. The nature and disposition may serve as useful taxonomic characters.

: Microchaetae

: Middorsal head setae

: Temple setae

: Sometimes near the base of the palps and the ventral surface of the head, there may be single or double sclerotized processes which are of generic importance (Menacanthus; Heterodoxus etc., figs. 1g & 20 pp). Their presence or absence are useful characters of specific importance. In Pseudomenopon, they are found in nymphal stage. (cf. post-palpal processes).

: A 'hair'-like outgrowth on the cuticle arising from an alveolus. It may be 'hair'-like or modified. The chaetotaxy in general is useful as a good taxonomic character only when other morphological characters also taken into consideration. Lest, exclusive dependence on this character results in burdening the group with new specific nemes, since the range in variation is often too large, and varies between populations, sexes, individuals and even on the two sides of an individual. Therefore, caution should be exercised in separating species based on this character alone. Seta is of chitinous origin in insects, while hair is of keratin as in mammals.

Seta 2 (fig. 2) : Stout second anterior seta in Ischocerophthirina. May be useful as a generic character (Anaticola) (Clay, 1951).

Seta 3 (figs. 44-45) : The third may be spiniform (Anatoecus), or flattened (Columbicola). Useful as generic character in Ischocerophthirina (Clay, 1951).

Setae 14-16 (fig. 4) : In some Amblycerophthirina (Menoponidae), these setae are of specific importance.

Setae 17-18 (fig. 4) : In some Amblycerophthirina (Menoponidae) the size and disposition of these setae are either generic (Oculiphilus) or specific (Colpoccephalum) importance, and the absence of 18 is characteristic in some genera (Myrsidea).

Setae 19-20 (fig. 4) : Usually referred to as ocular setae in Amblycerophthirina. 19 lies near the division of ommatidia and 20 is very small and marginal in position and some times well developed (Dicteisia) (Price, 1968).

Setae 21-22 (fig. 4) : Also referred to as occipital setae. Always present in Amblycerophthirina. Their relative length is used as a taxonomic character.

Seta 23 (fig. 4) : May be anterior, anterolateral, or in line with setae 21 and 22. A very useful specific character in Amblycerophthirina (ex. Actornithophilus, Clay, 1962). It is sometimes minute (Bucerophagus), or event absent (Myrsidea) (Clay, 1969).

Setae 24-30 (fig. 4) : Referred to as temporal setae (Clay, 1969), and are either marginal or submarginal. Seta 27 is a fine seta. The relative position of the alveoli of setae 26 and 27 may be either
adjacent (Menoponidae, Boopiidae except Paraboopia and Latumcephalum, and Laemobothriidae), or widely separated (Paraboopia, and Latumcephalum), and is constant within each genus and species; they are, however absent in some families (Ricinidae).

Seta 31 (fig. 4): A seta, a little anterior to the temporal seta no. 30, which may be long and stout. May be useful taxonomic character in certain genera and species of Amblycerophthirina.

Spatulate setae
(Borsten des Clayschenorgan; Claysche Busschelborsten): 13-15 setae are present on each of tergite VI of the female with spatulate ends, and smooth in texture (not ribbed as in the other abdominal setae) in the genus Cavifera and are held in a pocket on tergite VII (fig. 47). These setae are absent in male and also in any other known chewing-lice. They probably act as distributors of sex-attractant substances (Clay & Price 1970). The presence of these setae helps in distinguishing the female Cavifera. Occasionally other head setae may assume spatulate appearance (for e.g., Eulaemobothrion, Ciconiicola, Ornithopeplechthos) (Lakshminarayana 1970).

Spine
(Dornen): Though usually referred to in older literature, its usage should be restricted to thorny cuticular outgrowths distinct from sclerotized spine-like setae and are produced by undifferentiated epidermal cells and are usually multicellular in origin.

Spiniform setae
(Dornenförmige Borsten): Small spiniform setae are interspersed with normal setae, and are often found in certain genera on the genital region (Raliccola, fig. 48, ts)
Their variation in number and disposition may be specifically important.

Spurs: The tibial spurs in some (Damalinia, Piagetiella) may be useful characters of taxonomic importance. They are multicellular in origin.

Bristle: Asters: Combs: Sternal setae: Setae present on the sternites. The position and range are useful specific characters. Often divided as sternocentral or sternolateral setae, etc. Species should be established with great caution on the basis of these setae.

Sternal setae: Sternal setae arranged in a median row.

Sternal setae: Setae arranged on the sides of the sternites.

Sternal setae: Sterno lateral setae: Generally found in all Menoponidae postad to subocular seta (fig. 5, a, c) on the ventrolateral margin. Either absent or atypical in certain genera (Microctenia, Mchaerilaemus, and Ancistrona) (Clay, 1969)

Subocular comb: Subocular setae: Also referred to as lateroventral fringe in Amblycerophthirina. Situated posterior to the ventrolateral setae, a single or more setae (fig. 5, s) in this group is either of generic or specific importance in the Menoponidae and Boopiidae. In some genera (Meromenopon), a
Subokulare Borsten : Subocular setae
Subocular Borstenreihe : Subocular comb.
Szczecinka : Seta
Temporal setae (Schläfenborsten) : Setae on the temporal margin. In Amblycerophthirina, they are numbered 24-31 (Clay, 1969) (fig. 4)
Tergal setae (Tergale Hinterleibsborsten) : Setae borne on the tergites. Also subdivided as tergo-central, tergo-lateral, anterior tergal setae & posterior tergal setae etc.
Tergale Hinterleibsborsten : Tergal setae
Tergocentral setae (Tergocentr ale Borstenreihe) : A median row of setae arranged on the tergites
Tergocentrale Borstenreihe : Tergocentral setae
Tergolateral setae (Tergolaterale Borstenreihen) : Setae disposed laterally on the tergal segments.
Tergolaterale Borstenreihe : Tergolateral setae
Thoracic sternal setae (Sternal plattenborsten) : The setae arranged on the promeso- and meta-thoracic sternal plates are useful taxonomically.
Tuberculate setae of IX Segment (Warzenborsten) : A tubercle on the ventro-lateral edge of segment IX may bear one to three long setae (fig. 48, ts) in Ralicola-complex are either generic (?), or specific importance.
Ventral head setae (Ventrale Kopfborsten) : These setae are constant in all Menoponidae
Ventrale Kopfborsten : Ventral head setae
Ventral submarginal setae : A patch of submarginal setae occur ventrally posterior to the subocular comb row in Amblycerophthirina.
Ventral tibial setae (Ventrale Unterschenkelborsten) : Useful generic and specific character in Menoponidae
Ventrale Unterschenkelborsten : Ventral tibial setae
Ventrolateral setae : Two setae of which one is long and the other short.
The vulva may be margined with fine setae of good specific (rarely generic) value. Tuberculate setae of IX segment

Anal fringe

Mid-metanotal setae

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FIGURES
1. Representative members of various generally accepted families of the Chewing-lice:

Representative members of various families of chewing lice
2. Goniodid head (modified after Clay, 1951; Symmons, 1952) Conus. D. dorsal; dprs. dorsal pre-antennal suture; e. eye; ep. epistome; f. face; fr. frons; gl. gula; 1. labrum; mc. marginal carina; mtc. marginal temporal carina; o. osculum; oc. occipital carina; on. occipital node; p. pulvinus; pocn. postocular nodus; pran. pre-antennal nodus; pron. precocular nodus; tb. tentorial bridge; tc. temporal carina; te. temple; v. ventral; vc. ventral carina; setae: 1. dorsal submarginal seta; 2. anterior dorsal seta; 3. pre-antennal seta; 4. ocular seta; 5. postnodal seta; 6-9 marginal temporal setal (2-5); 10. post temporal-seta; 11-13. anterior setae; 14-15. ventral submarginal setae (1-3); 16-18. anterior ventral setae (1-3); 19. preconal seta; 20. mandibular seta; 21. marginal temporal seta (1).

3. Philopterid head (modified after Clay, 1951; Symmons, 1952): Ant. Antenna; a. lateral and ventral part of the clypeus; e. eye; ga. gena; gl. gula; 1. labrum; lc. lacinia; lb. labial palp; md. mandible; oc. occipital carina; p. pulvinus; pa. parietal area; sit. sitophore; tr. trabecula; vap. ventral anterior plate; vc. ventral carina; vp. ventral part of the anteclypeus.


5. Ventral view of the Menoponid head (after Clay, 1969): a. the two anterior subocular setae; c. subocular comb row; m. the four postmental setae; m. p. maxillary palp; s. subocular seta.


8. Male antenna of Goniodes mayuri (Lakshminarayana & Emerson)

9. Male antenna of Goniodes parviceps (Piaget)

10. Antenna showing secondary divisions in Eucolpocephalum sp.


17. Sitophore sclerite (after Snodgrass, 1944): a. distal arms; cf. branched filaments; ls. lingual sclerites; sit. sitophore; y. basal cornua.

18. Ventral view of the tip of the rostrum in *Haematomyzus elephantis* Piaget showing the rotated mandibles in black (after Mukerji & Sen-sarma, 1955).

19. *Ornithopeplechthos opisthocomi* (Cummings) male mandibles.

20. Head of *Heterodoxus spiniger* (Enderlein) showing postpalpal process (pp.)

21. *Falcolipeurus longiphallus* Zlotorzycka pre-antennal head showing the symmetrically placed pre-antennal nodi (pran).

22. *Struthiolipeurus stresemanni* Kéler pre-antennal head showing the asymmetrically placed pre-antennal nodi (pran).

23. *Laemobothrion vulturis* (J. C. Fab.) male head showing temporal striations.

25. Hind tibia and tarsus of *Damalinia limbata* (Gervais) showing the thumb-like structure on the tibia (t).

26. Claw in *Gliricola porcelli* (Schrank)


30. Female anal region in *Colpocephalum turbinatum* Denny.

31. *Reticulipeurus baileyi pucrasia* (Clay) terminal abdominal segments with subgenital process (s).

32. Male genitalia in *Saemundssonia lobaticeps* (Giebel): bp. basal plate; e. endomere; hm. hypomere; p. penis; pm. paramere; tl. telomere.

33. Symmetrical male genitalia in *Goniodes mayuri* (Lakshminarayana & Emerson); gs. genital sac.

34. Asymmetrical male genitalia in *Goniodes parviceps* (Piaget)

35. Ventral view of the male genitalia showing the distal area in *Degeeriella rufa* (Burmeister).


40. Terminal abdominal segments of the female in *Goniodes meinertzhageni* Clay.

41. Apophysis in *Damalinia limbata* (Gervais).

42. Female genital region in *Ibidoeus plataeleae* (Denny).

43. II abdominal sternite in *Myrsidea cornicis* (De Geer) showing asters (as).

44. Head showing the spiniform setae in *Anatoecus brunneiceps* (Giebel) after Cummings, 1916.

45. Flattened 3rd anterior setae in *Columbicola columbae* (Linne) 

46. Peg-like setae in *Laemobothrion*-complex.

47. Female tarsal sense organ showing sensory setae in *Cavifera adiba* (Clay & Price, 1970).

48. Female terminal abdominal segments in *Rallicola fulicae* (Denny) : ts. tubercle & setae.