The venation and areas of the corium of Tingidae have been causing considerable difficulty in their delineation and designation. Tanaka (1926) on the basis of his studies on the tracheation of wings had stated that a costal vein lacking in the wings of Heteroptera. China and Myers (1929) considered the anterior marginal vein in several cimicoid species as the subcosta. Drake and Davis (1960), while considering the homologies of the veins and areas of hemelytra of Tingidae suggested that the vein on the costal margin of the wing was to be designated as the subcosta. On the basis of this interpretation, they concluded that the vein inbetween their SC and RM was depressed dorsally and channelled between the so-called "costal" and "subcostal areas" and the same was ventrally elevated as a distinct ridge or the "hypocostal lamina". This lamina has been recalled in certain cimicomorphs as the downwardly deflected costal margin, suggesting a separation of the subcosta and the original costal margin, the latter remaining ventrad. The structure formed by the apparent shift in position of the costal margin has been termed by Drake and Davis (1960) as the hypocostal lamina which is indicated dorsally by the distinct hypocostal sulcus. A similar structure, but abruptly terminating midway at the cuneus, has been reported by China and Myers (1929) in species of
Miridae too. Accordingly, Drake and Davis (1960) recognized 3 longitudinal veins extending through the corium. They are SC, the anterior most vein; the RM and the CU. They designated/area between the SC and the RM as the costal area; and the area between RM and CU as the discoidal area and the terminal (membrane) area as the sutural area.

None of the earlier workers had recognized the hypocostal lamina, that remains vertically hanging ventrad, as a distinct area and for that reason the sulcus has been called by China and Myers (1929) as a vein between SC and RM. This interpretation has caused the basic deviation in the understanding and interpretation of the veins and areas of the corium of Tingidae. Livingstone (1967b) by studying the sections of the wing of Tingis buddleiae interpreted the hypocostal lamina as the ventrally displaced costal area, with the costal vein that forms the rim of the lamina originating at the anterior margin of the wing base. On the basis of this observation he designated the veins and areas of the corium in the following sequence (Fig.16). The letters in parentheses are according to Drake and Davis (1960):- SC(SC); SCA(CA); R (Hypocostal sulcus); RA (SCA); M (RM); discoidal are (same); CUPC (CU);PC (PC); PCA (None) and SA (SA). The term hypocostal lamina has been adopted here to designate the CA.

Examination of the hemelytra of more than forty species of Tingidae has shown that though the hypocostal
FIG. 16—WINGS—AREAS AND VENATION

Centoceder quinquicostatus

Lapiocentha parirostraphi

Lapiocentha parirostraphi

Ascentus urbanus
FIG. 16 WINGS—AREAS AND VENATION

A, A₁, A₂ - Anal vein
CL - Clavus
CLF - Claval furrow
C + Sc - Costa + Subcosta
Cu, Cu₁, Cu₂ - Cubitus vein
CV - Cross Vein
DA - Discoidal area
H - Hypocostal lamina
M - Median vein
M + Cu - Median vein + Cubitus vein
PCA - Post cubitus area
PCu - Post cubitus vein
PRCA - Precostal area
PRC - Precostal vein
R, R₁ - Radial vein
RA - Radial area
R + M + Cu - Radial vein + Median vein + Cubitus vein
R + Sc - Radial + Subcostal vein
Sc - Subcostal vein
SCA - Subcostal area
PLATE - I - WINGS - AREAS AND VENATION

1. Abdastartus atrus Magnification - 15 x 5 X
2. Aconchus urbanus - 5 x 5 X
3. Afrotingis phanuelii sp.nov. - 15 x 5 X
4. Agramma hupeharum - 10 x 5 X
5. Agramma graminii sp.nov. - 10 x 5 X
6. Agramma therasii sp.nov. - 10 x 5 X
7. Belenus dentatus - 5 x 5 X
8. Corythauma gibbossa sp.nov. - 10 x 5 X
9. Dictyla ka.natica sp.nov. -
10. Eteoneus cinchonii sp.nov. -
11. Cantacader quinquicostatus - 5 x 5 X
12. Phatnoma costalis - 10 x 5 X

CL - Clavus; Cu - Cubitus vein; DA - Discoidal area; H- Hypocostal lamina ; PCA - Post cubitus area; R - Radial vein; RA - Radial area; SA - Sutural area; SC - Sub costa.
PLATE - II - WINGS - AREAS AND VENATION

1. *Haedus grewii* sp.nov. Magnification - 15 x 5 X
2. *Haedus ruthii* sp.nov. 
3. *Haedus yacobii* sp.nov. -10 x 5 X
4. *Haedus manii* sp.nov. - "
5. *Lasiacantha justiciaii* sp.nov. - 5 x 5 X
6. *Lasiacantha peristrophii* sp.nov. - "
7. *Lasiacantha ruellii* sp.nov. - "
8. *Longiscutella menonii* gen.et sp.nov. - 10 x 5 X
9. *Naohila minuta* sp.nov. - 15 x 5 X
10. *Naohila nigra* sp.nov. - "
11. *Physatocheila asiatica* sp.nov. - 10 x 5 X
12. *Perissonemia earlyus* - 5 x 5 X
13. *Stephanitis cinnamomii* sp.nov. - "
14. *Stephanitis macranthaii* sp.nov. - "
15. *Tingia tomentosii* sp.nov. - 10 x 5 X
16. *Dasytingis semota* - 5 x 5 X

CL - Clavus; Cu - Cubitus vein; Cu + Pc - Cubitus + Post cubitus vein; H - Hypocostal lamina; SA - Sutural area; SC - Subcosta; SCA - Subcostal area; PCA - Post cubitus area.
lamina persists in all the species, its extent from the base towards the tip of the wing however vary considerably from species to species. In Phatnoma costalis and Cantacader quinquicostatus (Plate I, Figs. 11 & 12) it extends almost to the tip of the R whereas in all others it stops at any point beyond half the distance. It is also clear that the hypocostal lamina is invariably uniseriate and the areolae are much expanded and the series more in number at the base of the lamina. In Aconchus urbanus (Plate I, Fig. 2), such expansion is more pronounced. In Cantacader quinquicostatus (Fig. 16), in which a "stenocostal area" (to be discussed below) is found as a uniseriate lamina anteriorly bordering the wing, the hypocostal lamina maintains a distinct continuity with the former, suggesting the relationship between the two. For that reason, the terminologies and designation suggested by Livingstone (1967b) has been adopted here.

The subcostal and the post cubital areas are confluent in most cases but in Nacchila nigra sp.nov., Nacchila minuta sp.nov. (Plate II, Figs. 9 & 10), Perissonemia eomeles (Plate I, Fig. 12) due to the upward course of the R, the costal area almost vanishes apically. In Abdastartus atrus (Plate I, Fig. 1) the SCA is narrow throughout and interrupted subapically, the hypocostal lamina showing up at this subapical constriction of the wing. While in the majority of cases the SCA is uniseriate its cells are
unusually enlarged in *Aconchus urbanus* and multiseriate in *Cantacaderquina quinqui costatus*, *Belenus dentatus*, *Stephanitis* spp., *Dasytingis rudis* and *Corythauma gibbossa* sp. nov. (Plate I, Figs. 7, 8, 11 and Plate II, Figs. 13, 14 & 16). When the SCA is elaborated, the RA is much narrowed as in *Stephanitis*. In *Cantacaderinae* this area merges with the highly expanded sutural cum post cubital area due to the abrupt termination of the RCU. It is only in this subfamily the R and CU merge apically while M fades away before joining the CU.

The RA apically merges with SA sometimes remains confluent with PCA, as in *Perissonemia ecmeles*. But in *Aconchus urbanus* and in *Naocilia minuta* sp. nov. and *Naocilia nigra* sp. nov., due to the formation of tumid elevation in the RA, the meeting of the M with the R midway or by the meeting of R with CU as in *Cantacaderinae*, the RA ceases to be confluent with the SA. In *Eteoneus cinchonii* sp. nov. (Plate I, Fig. 10) due to the abrupt termination of the M, the RA and DA merge to form a tumid elevation, the CU forming the posterior boundary of this elevation. The RA is much reduced, almost to an uniseriate condition as seen in the members of the genera *Stephanitis* and *Haedus* (Plate II, Figs. 1–4 and 13 & 14) or it may be elaborately expanded as in *Cantacaderinae*. In *Aconchus urbanus* it is formed of just 3 large cells. In case of *Agramma graminii* sp. nov., *Agramma hupchanum*, *Agramma therasii* sp. nov.
Afrotinge phanuelii sp.nov. and Belenus dentatus (Plate I, Figs. 3 - 7), the RA and DA are confluent due to the fading away of M.

The SA is invariably the hyaline, pigmented area of the hemelytron of Tingidae and it is either confluent anteriorly with the RA as in several species or with the discoidal area as in Stephanitis or may be in the form of an island of 4 - 5 large cells as in Aconchus urbanus or as islets of several rows as seen in the members of the genera Agramma, Haedus, Perissonemia e.a.eles and Dictyla (Plate I, Fig.9) or it may be indistinguishably merged with the postcubitus as in Cantacaderinae.

The PCA, when defined, is invariably a single row of areolae and as described above in most cases it is confluent with the SCA. In the case of Nacchila spp. the cells of the PCA are unusually enlarged and in Stephanitis spp. the PCA is basally merged with the SA and DA. In Longiscutella menonii gen.et sp.nov. (Plate II, Fig.8) and in Perissonemia the PCA is distinctly confluent with the RA.

There is no cubital furrow but the claval furrow is constantly present as a membrane connecting the clavus and the corium. The development of the clavus and the arrangement of its areolations too vary considerably among
different species. It is developed to the maximum size with several rows of areolae in Cantacaderinae and is reduced to two (Stephanitis) to a single cell as in Eteoneus, Dulinius and Aconchus. The reduction in the size of the clavus is directly related to the general reduction in the number of areolae and areas of the corium.

The foregoing account of the variations in the delineation of areas of the Tingid hemelytra suggest that in the most primitive group such as the Cantacaderinae all the areas are well defined, each with the maximum number of rows of cells. Such a hemelytra is found to be absolutely free from any kind of armature. Reduction in the size of the areas and their complications are met with in Tinginae. But the maximum reduction in the number of areolae, the maximum degree of reduction in size of the areas and the merging of one area with the other with the formation of tumid elevations are found in Aconchus, a grass tingid; Dulinius and Eteoneus.

Development of pteriostigma on the R, L, RM, MCU and CU is commonly found in Cantacader, Haedus, Afrotingis and a few other species of Tinginae and the development of pterygopatmorphic armature appears to be an universal phenomenon in Tingidae. In Stephanitis the veins are serrated, in addition to the development of fine hairs. The serrations
PLATE - III - WING ARCHITECTURE AND SPINOCITY

(Magnification - 15 x 10 X)

Fig. 1 Cantacader quinquiscostatus

2 Eteoneus cinchonii sp. nov.

3 Phaenotropis cleopatra

4 Dulinus conchatus

5 Corythauma gibbosa sp. nov.

6 Stephanitis macranthii sp. nov.

7 Haedus ruthii sp. nov.

8 Agramma hupehanum

9 Eteoneus cinchonii sp. nov.
PLATE IV - WING ARCHITECTURE AND SPINOCITY

(Magnification - 15 x 10 X)

Fig. 1  Stephanitis charles

2  Stephanitis typica

3  Afrotingis phanuelii sp.nov

4  Haedus yacobii sp.nov.

5  Agramma graminii sp.nov.

6  Aconchus urbanus

7  Urentius hystricellus

8  Physatochiela asiatica sp.nov.

9  Tingis tomentosii sp.nov.
may be dentate type as in *Stephanitis charies* (Plate IV, Fig.1) and *Corythauma gibbossa* sp.nov. (Plate III, Fig.5) or minute as in *Stephanitis typica* (Plate IV, Fig.2) and *Dulinius conchatus* (Plate-III, Fig.4). In *Afrotingis* and *Aconchus* (Plate IV, Figs. 3 & 6) the anterior margin (SC) is armed with paired pedicellate short tuberculate spines and in *Agramma graminii* (Plate IV, Fig.5) such spines are more elongated and in single series. The SC may be lined by a very short feeble hairs as in *Agramma hupehanum* (Plate III, Fig.8) or may be lined with long ciliate hairs as in *Eteoneus cinchonii* sp.nov. (Plate III, Fig.9) or may be heavily armed with pedicellate porrect spines as in *Haedus* spp. (Plate IV, Fig.4) or very stiff erect pedicellate spines as in the members of the genus *Acanthocantha, Tingis buddleiae* and *Urentius* spp. (Plate II Figs. 5 - 7, 15 & Plate IV, Fig. 7 & 9). Occurrence of cart-wheel pattern of arrangement of spines bordering the cells particularly in the discoidal area is characteristic in *Physatocheila asiatica* sp.nov. (Plate II, Fig.11 & Plate IV, Fig.8) and development of trichobothrium type of pegs along the veins is characteristically found in *Haedus ruthii* sp.nov. (Plate III, Fig. 7).

Thus the diverse development of pterygopolymorphic armature appears to be a special feature of the subfamily Tinginae and such developments, do not indicate any evolutionary trend except it may suggest that complicated development of this armature could be related to the habitat.
adaptation and camouflaging. The total absence of such armature on the wings of Cantacaderinae (Plate III, Fig.1) is considered here as a less specialized feature perhaps correlated with primitiveness of this subfamily and development of special kind of pegs on restricted areas of the veins such as bases of CU-PCU as seen in Eteoneus cinchonii sp. nov. and Phaenotropis cleopatra (Plate III, Figs. 2 & 3) appears to be an additional features of specialization.

Drake and Davis (1960) named an uniseriate precostal area as the "stenocostal area" considering it as the anterior margin of the "costal area", the former separated from the latter by a prominent longitudinal vein running parallel to their "subcostal" vein. Discovery of this parallel vein has caused them certain difficulty in designating the subcostal vein itself and in order to provide a viable interpretation they called the stenocostal area as the "costal area" itself. Drake and Ruhoff (1965) realising the confusion further tried to maintain the status of costal area instead of the subcostal area as described. With this background interpretation, Proeschner (1968a) examined several species of the tribe Cantacaderini and found that the stenocostal area has a dorsal and a ventral expression, the former as the "stenocostal area" proper and the latter as disrupting the hypocostal lamina which according to him remains uninterrupted in other Tingidae. The present investigation corroborate the findings of
Froeschner but confirm that the hypocostal lamina is nothing but the costal area deflected ventrad and associated with the radial vein. The "stenocostal area" therefore represents the precostal area bounded anteriorly by the precostal vein, which according to Snodgrass (1935) is a small first vein of the wing of certain fossil insects. Cantacoider is decidedly the most primitive of the Tingidae (Drake and Ruhoff, 1965).

II-2. Metathoracic wing:

In Tingidae the metathoracic wings are not always well developed even in the macropterous forms and the power of flight is poorly developed. Tingids often perform circled flights and very few species are attracted to light. The hind wings are membranous and hyaline, completely concealed by the hemelytra. In a generalised type there are five main veins, which except in cases of drastic reduction as in Aconclus urbanus (Fig. 16) remain almost constant in all species. The designation of venation is after Livingstone (1967b) and the letters in parentheses after Drake and Davis (1960). Accordingly the veins are: C + SC (SC); SC + R (RSC); M (CU); CU (none) and AN (none). All these five main longitudinal veins terminate subapically and the cubital furrow behind the CU is quite evident by the folding of the wing along this furrow.
The C + SC is quite short, running along the anterior margin of the distal half of the wing. The serrations along its inner surface engage the comb-like bristles of the clavus of the hemelytra. The broken away sub-costal part of it is indicated by a slightly declining stump directing towards the caesure of the SC+R. In *Teleonemia scrupulosa* and *Corythucha* sp., Hoke (1926) considered this vein as the costa proper. The second longitudinal vein (SC + R) beyond the caesure is the radius and behind it is the SC. The R meets the anterior branch of the M and both continue as RM upto the apex as in the description given by Drake and Davis (1960) and it corresponds SC + R, of Hoke (1926). As the wings fold the clavus travels upto the caesure and the latter engages the former.

The proximal part of the M has been termed as the "hamus" by many Heteropterists. Distally the M divides into an anterior branch (M₁) and a posterior branch (M₂), the former ascending up to meet the R, as described by Drake and Davis (1960). They claimed that hamus is absent in Tingidae. The M₂ runs anteriorly as a single vein. Hoke (1926) considered M as M₁ + M₂ and Drake and Davis (1960) termed it as CU. In several species it is found that the M is separated from the wing base and so also the CU. The CU divides into CU₁ and CU₂, corresponding to M₃ and M₄.
of Hoke (1926) and "secondary veins" by Drake and Davis (1960). The CU, is often found to be broken at its base. The cubital furrow separates the CU from AN and the latter invariably maintains its origin at the base and divides into AN₁ and AN₂. The anterior branch of the anal vein has been considered as CU by Hoke (1926) and post cubitus by Drake and Davis (1960) and Davis (1961). The A₂ has been termed as A₁ by these authors.

The hind wing is much reduced in Aconchus, Stephanitis and Dulinius under such reduction only the M, CU and A are present as rudiments.