questions that are pressing upon the attention of Congress, there is none more important and exigent than attention to this matter which has been brought up by the senator from Connecticut. I do not believe we can afford to wait a single day in giving our attention to some method of relief. I understand from the report made by the secretary of the interior that the quantity of air to each individual in the part of the building where these ladies worked is about 400 cubic feet, whereas Dr. Billings, the best authority perhaps in the United States or in the world on sanitary matters of this kind, says that human life cannot be healthfully continued without something like 4,000 cubic feet to the individual. I asked the gentleman who has charge of that room how they managed to get along at all, and he said that at intervals of about two hours or an hour and a half they had to ask all these people to go out of the room — in winter time, of course — so that they might raise the windows in order to change the air; otherwise they could not get along as well as they do. That condition of things is shameful as well as deplorable, and I think some action ought to be taken at once in the interest of the human beings who are compelled by their necessities to perform their duties under such circumstances.' "

THE STRUCTURE OF THE HEMIPTEROUS MOUTH.

OUR knowledge of the mouth parts of the Hemiptera is given by Professor Comstock in his valuable "Introduction" as follows: "The mouth parts are formed for piercing and sucking. Without dissection they usually appear as a slender, jointed beak, arising at the base of a shorter, pointed labrum. This beak consists of four bristles inclosed in a fleshy jointed sheath. Two of the bristles represent the

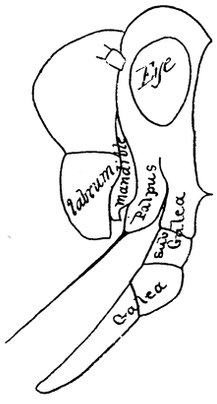

FIG. 1.

mandibles and two the maxillæ. The sheath is supposed to consist of the labium and grown-together labial palpi. This sheath is usually four jointed, and is never composed of more than that number of segments. The maxillary palpi are wanting." The results of my studies in the Diptera, Hymenoptera and on the pupa of Cicada, lead me to disagree with this explanation, or homology, of the parts.

The head of a Cicada pupa when softened and cleaned so that all the parts are easily recognizable, shows four divisions, or sclerites, forming the lateral margin of the head inferiorly. In Fig. 1 the sclerites are shown, pried apart for convenience of recognition, and without attempt at any but diagrammatic result. The anterior of the sclerites is the labrum, covering the base of the mouth, and normally appressed so close to the beak that the intervening structures are not visible. Behind the labrum and normally closely united to it is the mandibular sclerite, which has not been heretofore recognized, but which is exactly where it should be, compared with a mandibulate mouth. From the side this sclerite gives a mere indication of its character and from the firmness of the union shows that the mandibles are not mobile and therefore not functional. Cutting along the posterior suture of the mandible and then straight across so as to get

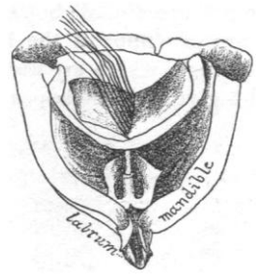

FIG. 2.

the whole of the labrum, we get from behind the view shown in Fig. 2. Here the mandibles show as elongated flattened strips, quite chitinous in texture toward the tips, which latter are acute and somewhat beak-like, divergent. The extremities lie so close to the pointed tip of the labrum that they are invisible from the side. In the cavity between the mandibular sclerite and the front of the labrum there is at least one large gland, probably that secreting the irritating fluid which many bugs inject into the punctures made by the beak. From this gland a distinct duct leads to the pointed

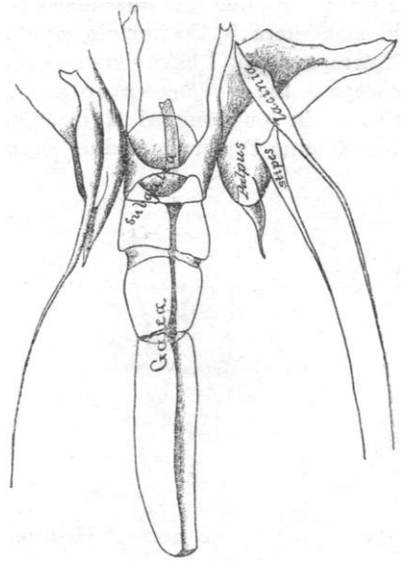

FIG. 3.

tip of the labrum behind and between two chitinous wings giving muscular attachments. In *Belostoma* the labrum is extended so as to cover the beak for half its length. Here there is a salivary gland behind the clypeus, the duct extending to the tip of the labrum and then apparently discharging into the beak. In some species the labrum is set inwardly with a coating of very fine, dense hair, giving a velvety surface, and this, as Dr. Packard has shown is the epipharynx. It is not present in the Cicada pupa. The sclerite next behind the manibular ring is that from which arise the two bristles that are usually homologized with the mandible and

maxilla. That neither of them can be mandible follows from the fact that I have already demonstrated the true mandible. Removing the front rings altogether and spreading out flat the two posterior sclerites after removing the internal structures, we have the appearance shown in Fig. 3. In this figure we see the intimate connection between the beak and the maxillary structures. The two bristles are seen to arise from one base, and attached to the same source is the remnant of the maxillary palpus. The organ is much reduced, and probably not functional; but there is no doubt of its nature. By the pressure applied the base of the bristles is torn from the fastenings, which are distorted out of recognition. Figs. 4 and 5 give the true appearance. These two

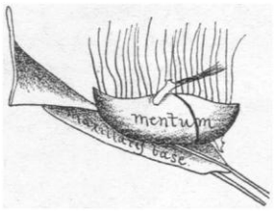

FIG. 4.

bristles represent the lacinia and stipes of the maxilla, developed in exactly the same way in which they are seen in the Diptera. In most species they are quite strongly modified at the tip and there is a permanent distinction in the character of the armature of the two bristles which will be of assistance ultimately in distinguishing the parts.

The remaining maxillary part, the galea, I identify with the beak, denying thus its character as labium and grown-together labial palpi. No one has questioned the fact that the beak in the Hemiptera is the homologue of the similar structure in Diptera, and this I have shown is a galear development. The steps in the development are clearly shown by studying a series of the long-tongued Hymenoptera in connection with the piercing Diptera including Erax and allies.

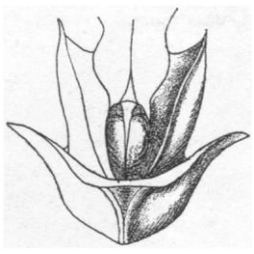

FIG. 5.

Exactly how the change to the normal Hemipterous structure occurred, I have not yet been able to ascertain. In this view the basal segment of the beak through which it is attached to the other maxillary parts, represents the cardo; the second joint the subgalea; while the third and fourth represent the two joints of the galea. In the apparently three-jointed beak the basal segment is so intimately connected with the head that it seems to form a part of it. Dissecting away all tissue from the head and leaving only the cardo of the maxilla and the other internal mouth structures attached thereto, we have the appearance from behind shown in Fig. 5. Centrally there is a boat-shaped structure, on either side of which there is a flat chitinous plate with two leaf-like membranous processes attached. On each side of this central plate, and imbedded in the tissue, is one of the lancets. Seen from the side, as in Fig. 4, the boat-like form of the central organ is more obvious as are also the maxillary base and the lancets issuing therefrom. This boat is formed of two parts closely united along a suture which is parallel to the line of the suture separating the labrum, the anterior portion belonging in the cavity behind the labrum, the remainder belonging to the central head cavity. That portion of the process belonging in the frontal portion of the head is shown in Fig. 2 superiorly. Through the centre of this boat on the inside is a thin membranous plate, longitudinally furrowed in its centre, and from this central furrow sending up long flat filaments, the nature of which I have not recognized. This boat-shaped process I homologize with the mentum in mandibulate insects, the fulcrum of the Diptera. It is all that remains of the labium or second maxilla, if my interpretation of the structures is correct. Exactly at what point in the development the missing structures were lost, I cannot yet say; it will require close study in groups in which I have as yet no material at all. I am confident, however, that the above explanation of the homology of the structures will prove the true one.

JOHN B. SMITH.
Rutgers College, N. Y.

THE ETYMOLOGY OF THE TWO IROQUOIAN COMPOUND STEMS, -SKĔ^{N}-RA-KEQ′-TE' AND -NDUTA-KEQ′-TE'.

STUDENTS of Iroquoian terms have made attempts to analyze these two interesting compound-stems, but in making these analyses they overlooked the force and exact meaning of the component elements of these two stems, and so the etymologies they have put forth are erroneous. Too much weight was given to so-called "accepted authority," and indiscriminating compilation took the place of careful research.

It appears from the evidence of language that hitherto all students who have attempted to analyze these two compound terms have been misled by a mistranslation of the noun *Gaskenra*, made by Father Bruyas in his work mentioned below.

The writer will here cite what has been written by him upon the two stems in question as well as what has been written upon them by other authors who have had access to his writings. This is done for the purpose of showing to what extent Bruyas's erroneous translation has been an embarrassment to all his copyists; for they invariably quote his wrong definition of the noun in question, and yet make remarks, the reasons for which should have led them to the true etymology and signification of the elements and terms in question.

Father Bruyas[1] succinctly says, "*Gaskenra*, la Guerre. Inde *hoskenragetete*. S. 2ae conj. soldat." Again, on page 83 of the same work, he writes, "*Onn8ta*, coton, duvet." And immediately below this, "*Nond8stage^{e}te*, la Guèrre. *Hotinnond8stagetete*, les soldats."

Father Cuoq, following his predecessors in Iroquoian glottology, writes,[2] "*Oskenra*, vieux mot qui n'est plus guère usité qu'en cp. avec le v. wakkehte, porter. Il devait signifier la *guerre* ou plutot qq. instrument de guerre. Roskenrakehte, au pl., rotiskenrakehte, homme de guerre, guerrier, militaire, homme portant armes." This citation may be translated thus: "*Oskenra* [is] an old word which is not much in use now except in composition with the verb *wak-*

[1] "Radices Verborum Iroquæorum," Neo-Eborac, 1863, p. 98.
[2] "Lexique de la Langue Iroquise," Montreal, 1882, p. 36.