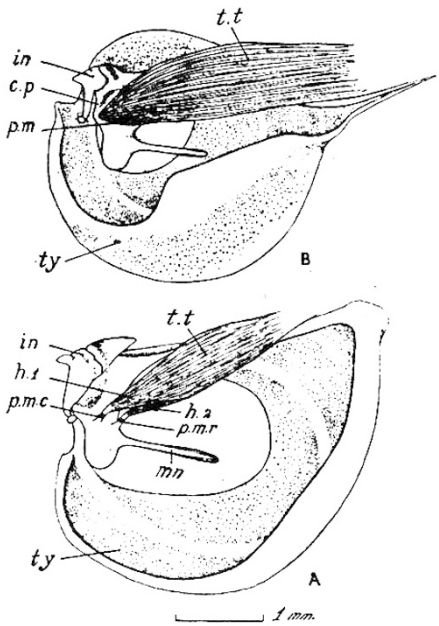

MALLEUS, INCUS AND TENSOR TYMPANI MUSCLE OF *Rhinopoma microphyllum* (*A*) AND OF *Nycteris thebaica* (*B*). INTERNAL VIEW. *c.p.*, cephalic peduncle; *in.*, incus; *mn.*, manubrium; *p.m.*, processus muscularis (*p.m.c.*, its caudal part, and *p.m.r.*, its rostral part, which corresponds to the accessory process); *t.t.*, tensor tympani muscle (*h.*1 and *h.*2 are the long inner and short outer heads respectively); *ty.*, tympanic bone.

(Emballonuridæ), in *Tadarida ægyptiacus* and *T. teniotis* (Molossidæ).

The two heads of the tensor tympani are variously developed in the different species. They are of almost equal size in *Rhinopoma microphyllum* (Fig. *A*); however, the short head is smaller than the long one in *Asellia tridens*, *Tadarida ægyptiacus*, *T. teniotis*, and is much reduced in *Taphozous perforatus* and *Liponycteris nudiventris*. The short head appears to be lacking in *Rhinolophus acrotis* (Rhinolophidæ), *Pipistrellus kuhli*, *Otonycteris hemprechi* and *Scotozous rüppelli* (Vespertilionidæ) as well as in *Rousettus ægyptiacus* (Pteropidæ-Megachiroptera).

Eschweiler (*cit.* Edgeworth[2]) stated that in *Ornithorhynchus* the tensor tympani consists of two parts which are inserted into the malleus.

Among bats the two muscular processes may be connected by a low ridge as in *Tadarida ægyptiacus* and *T. teniotis* or may merge into one another forming a broad and prominent projection as in *Taphozous perforatus* and *Liponycteris nudiventris*. A broad crest-like processus muscularis is found in *Nycteris thebaica* (Nycteridæ), in which species the tensor tympani is inserted along the broad edge of the process (Fig. *B*).

Doran's figures and description of the malleus in the different species of mammals indicate that the processus muscularis, which is generally located at the base of the manubrium, may be found either on the cephalic peduncle (neck), much in front of its usual site, or lower down on the manubrium midway between its base and tip. It can, therefore, be assumed that in the pre-mammals the processus muscularis might have extended between these two extreme points and that the tensor tympani was inserted along its broad edge. The case of *Nycteris thebaica* is an approach towards this state and can be considered as a primary condition from which those found in other bats may be derived.

The different species of bats examined, therefore, present stages in the separation of the tensor tympani muscle into two portions, and in the disappearance of one of these parts, namely, the short outer head with corresponding modifications in the form of the muscular process.

Full details of this study will be published elsewhere.

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Successful Feeding Experiments with an Adult Trombiculid Mite (Order Acarina)

ALTHOUGH certain species of Trombiculid mites belonging to the sub-family Trombiculinæ have long been suspected of being the carriers of tsutsugamushi disease, now more commonly referred to as scrub typhus, it is only recently that Blake *et al.*[1] have demonstrated the presence of *Rickettsia orientalis* in *Trombicula fletcheri* Womersley and Heaslip. In their paper, which contains a valuable review of the literature on scrub typhus, they say that "existing knowledge regarding the life-history, habits and bionomics of trombiculid mites is quite inadequate in view of their importance as disease vectors and pests of man". This is particularly true of the feeding habits of the nymphal and adult stages. Miyajima and Okumura[2], who first established *Trombicula akamushi* (Brumpt) as the vector of tsutsugamushi fever in Japan, say that "in nature the nymph and adult seem to live on the juice of plants". Womersley and Heaslip[3], too, appear to believe that the adults are probably vegetarian. Banks[4], on the other hand, makes a general statement to the effect that the mature mites feed on small insects, and mentions particularly plant lice, young caterpillars and grasshopper eggs. But he gives no details of any observations on the subject. Blake *et al.* (*loc. cit.*), in summing-up our present knowledge of the feeding habits of the nymphal and adult stages, say that "the food of these stages is variously reported to include plant juices, decaying organic matter and insect excrement". It would appear, therefore, that though adults have occasionally been reared in the laboratory there are few, if any, definite records on their feeding habits. Indeed it would seem doubtful whether they have actually been observed in the act of feeding.

While engaged recently in carrying out observations on the association of *Mansonia* (*Mansonioides*) *uniformis* (Theobald) with a species of the water fern *Salvinia* (possibly *auriculata*), a recently introduced pest which is spreading with great rapidity in and around Colombo, we came across large numbers of a relatively large adult Trombiculid mite. The *Salvinia* has now completely choked up what was formerly a large pond, and mites were found crawling actively about the plants. Examination of the soil on the banks also revealed the mites in numbers larger than we had ever previously experienced in our studies of Trombiculids in Ceylon. The mite displays the figure of eight form so characteristic of the nymphs and adults of this group and is bright red in colour. Several adults have laid eggs in the laboratory and the larvæ that emerged have been found to be identical with larvæ collected previously from the ears of bandicoots (*Bandicota malabarica* (Shaw)) trapped in the vicinity. Some of these larvæ have been bred out to the nymphal stage by a technique already described (Jayewickreme[5]). The mite appears to be identical with *Trombicula acuscutelleris*, Walch.

As the adult mite had been found crawling about the leaves of *Salvinia* on some of which were numerous clusters of eggs of *M.* (*M.*) *uniformis*, we decided to test the possibility that the mite may feed on these eggs in Nature. Accordingly, we offered several mites the opportunity of feeding on egg clusters in the laboratory and found that they readily attacked them. Actual imbibition of fluid through the cheliceræ into the gut was observed under the microscope, and complete distension of the abdomen invariably followed a full feed. We later offered the mites the ovaries of a gravid *Mansonia* mosquito which had been dissected out, and found that they fed readily on them too. Afterwards we observed them feeding on the ovaries of *Anopheles subpictus* Grassi and *Anopheles vagus* Donitz. Finally, we decided to offer a batch of about fifty adult mites a gravid *A. subpictus* mosquito, which had just been killed by stunning. The mites immediately clustered round the mosquito and within a couple of hours it had been sucked dry. They have since fed in the same manner on several occasions.

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Action of α-Hydroxyisobutyric Acid on Micro-organisms

IN connexion with a recent letter by Lovelock[1] on the use of organic acids, including α-hydroxyisobutyric acid, as aerial bactericides, some other observations on the properties of the latter acid may be of interest. Its non-assimilability by moulds has already been noted[2], as well as its application to the preparation of buffers which resist the action of moulds[3].

It was also found that in a synthetic culture medium at *p*H 3·8 the acid was not metabolized as the sole source of carbon by eleven species of yeasts and torulæ, although under similar conditions seven of them slowly metabolized commercial *dl*-lactic acid as indicated by growth in the medium and a rise in *p*H. In media of higher *p*H, the acid was possibly assimilated by only one of thirty-seven species and strains of saprophytic bacteria. In a single lot of media, *Alkaligenes fæcalis* appeared to metabolize the acid, but this result could not be reproduced in later lots.

In ordinary culture media where the conditions of *p*H, temperature and nutrition were otherwise favourable, α-hydroxyisobutyric acid (and its homologue α-hydroxy-*n*-butyric acid) in concentrations as high as 128 mgm. per 100 c.c., did not inhibit the growth of the pathogenic bacteria *Erysipelothrix rhusiopathiæ* Lederle No. 358, *Diplococcus pneumoniæ* type I, strain SV, *Streptococcus hemolyticus* strain C203, *Pasteurella multocida* Lederle strain, or *Mycobacterium tuberculosis* var. *hominis* No. 607 of the American Type Culture Collection.

These results indicate that the α-hydroxyisobutyric radical *per se* is physiologically indifferent to most if not all micro-organisms and is not readily metabolized or otherwise broken down. On the other hand, it has no pronounced antibacterial properties. Its activity as employed by Lovelock is probably owing to the production of a strongly acid reaction, since a 0·2 *M* solution of α-hydroxyisobutyric acid has a *p*H of 2·30, while a saturated solution has a *p*H of approximately 1·40 at 25° C. In neutral solutions, the α-hydroxyisobutyric radical is without marked effect on the animal body. The calcium salt (stabilized with borate) is used to some extent in veterinary medicine to remedy calcium deficiency in cattle, under the name of 'calcium borohibate Lederle'.