The book before us is, fortunately for us, written in English. It is printed admirably in large, well-spaced type. It covers 558 pages and is illustrated by thirty-one plates carrying eighty-three figures. These figures are of hypopygial structures and larval details. The work is practically exclusively of a taxonomic character. It includes full descriptions of all the species found by the Bonnes in Surinam, except certain species of *Culex,* subgenus *Choeroporpa* and also gives short notes on all the other species of tropical America known to them. In spite of its rather strict taxonomic character, there are occasional interesting and important biological notes appended to the descriptions. We wish there had been more of these notes and that the authors had been able to insert a separate chapter on group habits and ecology. Although three pages are given to the habits of the yellow fever mosquito, it would have been extremely interesting had they included absolutely everything about this important species that came to their notice in their years of study in Guiana. Their account of the apparent spread of the species from the coast to the interior is suggestive and may be of significance in the consideration of the question of the original home of yellow fever and the mosquito that carries it.

It is quite possible that from the sub-title of the book a misconception may arise as to its scope. It is in no sense a complete treatise on Neotropical mosquitoes. We think it would have been better if Dr. and Mrs. Bonne had confined themselves to the original title, "Mosquitoes of Surinam." Then the original and painstaking observations on those insects would have appeared without dilution. From the sub-title, "A Study of Neotropical Mosquitoes," one would expect a mention of all the recorded Neotropical forms. The authors surely did not intend this construction, since they had but little first-hand information from regions farther south. It results that there is much compilation, in which the original observations seem lost. Of course the new matter is still there, but it has to be delved for and seems fragmentary. Simply the mosquitoes of Surinam would have been a condensed and very creditable piece of work.

If under a natural misconception from the subtitle we were to consider the work as a compilation of Neotropical mosquitoes, it is very incomplete. To begin with, the authors were apparently frightened at the large number of small *Culex* of the group *Choeroporpa,* and they simply left them out. At least the species might have been listed and the probable synonymy, in the opinion of the authors, pointed out. There are forty-five species recognizably described in this group, of which our authors notice but fourteen. By restriction to the tropics and omission of these recently described, the list would naturally be reduced somewhat; but still the omission may be considered serious. Other omissions are less important, but can be picked up here and there. They serve, however, to diminish the authoritativeness of the work as relating to the whole Neotropical fauna. Especially with the Sabethids, lack of personal acquaintance with the species has led to occasional repetitions, as with *homotina,* treated both as a *Wyeomyia* and a *Goeldia.* The Brazilian species described by Lutz and Peryassú have been omitted, as is stated. We think they should have at least been listed. Some day we shall find out what these species are; but with the specific criteria at present in use the old descriptions are worthless. We do not blame our authors for not going further; but we wish the work had been complete for the Neotropics.

But all this concerns itself with what might have been. We realize that the authors' work was done in Dutch Guiana, and that, as an account of the mosquitoes of Surinam, the work has a very high rank. With the exception of Panama, and excluding the work done in Brazil, we do not know of another tropical American region in which the Culicid fauna has been covered with the intelligence, care and completeness exhibited in this volume.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLE METHOD FOR OBSERVATION OF THE LIVING CHICK EMBRYO

DURING the progress of a series of observations[1] by the author on the effects of suffocation on the chick embryo, it became very desirable to know the exact time of the cessation of heart beat. It seemed to us that it should be possible to remove a portion of the shell, cover the egg loosely to reduce evaporation and observe the embryo as often as desired. We first tried removing about a fourth of the entire shell from the top of the egg when it was lying in a horizontal position, placing the egg on a piece of paper, covering it with a beaker or tumbler and placing the whole in the incubator. This method enabled us to observe embryos from their forty-fourth hour of incubation to about their hundred and twentieth hour. Eggs opened before the forty-fourth hour of incubation seldom developed further.

Then it was found that by removing about a square inch of shell from the large end of the egg, together with a little albumen, placing the egg in a vertical position in the neck of a short, wide-mouthed bottle, (simply for support in that position), and covering

[1] Byerly, T. C., 1926, "Studies in Growth. I. Suffocation Effects in the Chick Embryo," *Anat. Rec.* vol. 32.

bottle and egg with a beaker just tall enough to clear the egg, the embryo would develop from the twenty-fourth to the hundred and tenth hour of incubation. The embryo came into view at the edge of the exposed surface very soon after the shell was removed. Mortality was rather high.

Up to this time, we had been unsuccessful in developing normal embryos in eggs from which such an area of shell had been removed prior to incubation. But at this point we found that by retarding evaporation still further by plugging the tumbler or beaker used as a cover loosely with a towel or with cotton it was a very simple matter to observe approximately normal development in the embryo from the unincubated stage to about one hundred five hours incubation. These chicks die at a remarkably uniform age; they do not die from the direct effects of evaporation. The causes of their death are being investigated in these laboratories at present.

This method makes it possible for any undergraduate student to study the first four days of the development of the chick embryo in the same chick, to catch any desired stage for histological study, and that without the mastery of a difficult technique or a supply of expensive apparatus. It is almost superfluous to point out the added ease of experimentation that this technique offers the investigator of the early developmental physiology of the chick embryo.

The materials required are: 1 tumbler, 6″ x 2.5″; 1 straight-side bottle, 3″ x 1.5″, and one small towel. The bottle and tumbler should be washed with 95 per cent. alcohol; further sterilization has so far been unnecessary. The towel should be crumpled and placed beneath the bottle containing the egg and all three inserted into the tumbler until the surface of the egg almost touches the bottom of the tumbler. The assembled apparatus is placed in the incubator and may be removed for observation at will. Frequent dissembling of the apparatus for brief intervals to expedite closer inspection seems to do no harm.

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SPECIAL ARTICLES

THE ORIGIN OF VACUOLES

DEVELOPMENT of vacuoles in the cytoplasm of plant and animal cells is not uncommon both under experimental and natural conditions. As regards plant cells our own historical approach to the subject may be cited to illustrate the fact.

For many years our students have been instructed to study a vacuolization of the cytoplasm that chromates and dichromates in plasmolyzing concentration produce, *e.g.,* in the epidermal cells of onion bulb scales.[1] Later, a similar frothing of the cytoplasm in various cells was noted to occur with any plasmolytic agent after preliminary action of trivalent cations even in very dilute solution.[2] In sufficiently high concentration, however, even the most innocuous plasmolytes by themselves may cause subsidiary vacuoles to arise in the cytoplasm—a matter of common observation.

It is not only with plasmolyzing agents that this effect is produced, but also with other more readily penetrating substances, *e.g.,* narcotics such as chloroform and ether and by salts after exposure to very low concentrations (1 per cent.) of these. The outer surface and also the interior of the chloroplasts are common situations for the vacuoles to arise when produced in this way, as was observed even by von Mohl.

But without any artificial influence similar vacuoles may form in normal cells. One of us recently demonstrated their constant occurrence in the gametes during the conjugation process in *Spirogyra*[3] and further proved their excretory function as exercised in the taking up of water from the central vacuole and its discharge to the exterior in typical "contractile" fashion. The same author has recently found *Vampyrella* to be comparable in a remarkable degree to the gametes of *Spirogyra,* in that rapid excretion of water takes place by the activity of numerous contractile vacuoles appearing anywhere in the hyaline zone of the body; and that in addition to water, solid excreta are ejected by the simultaneous action of small vacuoles dispersed beneath the entire free surface.

To this is now to be added two principal facts primarily observed by the other writer, but studied by both of us, *viz.,* (1) that the vacuoles produced under the action of a strong plasmolyzing agent are also contractile, and (2) that these vacuoles originate from peculiar bodies already present in the cytoplasm. These bodies, more fully described elsewhere, bear a strong resemblance to the growths of lecithin in water which have long been known as "myelin forms." They are normally of irregular and varying shape and consist of an external lipoid (osmic acid reducing) film which is usually liquid and extensible, enclosing apparently a more aqueous interior which is usually in circulation.

On treatment with a rather concentrated plasmolyzing agent, *e.g.,* 1M or .75M cane sugar, the irregular

[1] Lloyd, F. E., and Scarth, G. W., "An Introductory Course in General Physiology," Montreal, 1921.

[2] Scarth, G. W., "Adhesion of Protoplasm to the Cell Wall and the Agents which cause it," Proc. Roy. Soc. Can. Ser. II, *17*: 137, 1923.

[3] Lloyd, F. E., "Conjugation in Spirogyra," Trans. Roy. Can. Inst. *15*: 129, 1924.