Land[2] has recently described a fixing fluid for paraffin sections which is much superior to the albumen fixative in general use. I have been using a similar fluid for some time and have found that it works equally well for celloidin sections, and much better than the albumen method of fixation as described by Plowman. Land gives a formula for making the fluid for paraffin sections, but for celloidin sections I have found that by placing a few small pieces of gum arabic in distilled water and shaking until the bubbles formed cease to break readily, enough of the gum will be dissolved to answer all purposes. A sufficient amount of potassium bichromate should be added to give the fluid a slightly yellow color. Land advises adding the bicromate when the sections are mounted, but by preserving the fluid in a blackened bottle it will keep in good condition for months.

Two methods may be used in mounting the sections. If they are small and the entire series can be arranged on one or two slides, the knife can be wet with 90 per cent. alcohol when cutting, and the sections removed to a clean slide as they are cut. After the slide has been covered with sections, the alcohol is allowed to dry, or is removed with a small piece of filter paper. A drop of the fixing fluid is now added and the slide tilted to allow it to run underneath the sections. The excess of fixing fluid should be removed by placing a piece of filter paper on top of the sections and gently pressing down. If care is exercised in doing this it is very seldom that any of the sections will adhere to the paper. Occasional sections that do adhere, however, can be easily removed from the paper and put in place again. Another slide should be slightly oiled and placed on top of the sections, after which it is clamped down. The slide should be left to dry in strong sunlight for a few hours.

If the sections are rather large and it is not necessary to save the entire series, the knife can be wet with glycerine alcohol and the sections removed to a large slide or piece of glass as they are cut. Such sections as are needed for study can be subsequently transferred to another slide, first carefully washing them to remove all traces of glycerine.

If care is taken in removing the excess of fixing fluid from the sections at the start, the oiled slide can be removed after drying without injuring any of them. I have mounted as many as one hundred rather large sections in series by this method and they all came through in perfect condition.

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[2] *Bot. Gaz.*, 59, pp. 397–401.

THE RÔLE OF ANOPHELES PUNCTIPENNIS SAY IN THE TRANSMISSION OF MALARIA

As the result of recent experiments conducted in New Orleans, Louisiana, *Anopheles punctipennis* Say has proved itself to be an efficient medium for the development of the sexual cycle of the organism of tertian malaria, *Plasmodium vivax*.

Of previous attempts to determine the exact status of this species of *Anopheles* the most thorough was that of Hirschberg who in a series of carefully executed experiments obtained only negative results in infecting *A. punctipennis* with the gametes of estivo-autumnal malaria. As further evidence of this negative rôle, he states that no cases of malaria were found to be developing in a certain section of Maryland where the species was common, and that he had never found naturally infected *punctipennis* here or elsewhere as had been done with *A. quadrimaculatus*.

Dupree, however, in a list of efficient hosts of malaria includes *punctipennis* as having been so determined by himself. No other details are given and Knab in 1913 was inclined to the belief that he had in reality experimented with *A. punctipennis*, which is now recognized as a distinct species and as an efficient host.

Anopheles punctipennis is one of the common species of the genus in the United States and because of its abundance and wide distribution the question of its agency in the spread of malaria is an important one. To record the fact that the parasites of one form of the disease may successfully develop in this species is the purpose of the present note, which will

be followed by a more detailed account of experiments.

On November 6, 1915, six specimens of *A. punctipennis* were allowed to feed on a patient in whose blood had been demonstrated the gametes of tertian malaria. The mosquitoes had been bred from larvæ and before and after the blood meal were given only raisins and water as food. They were kept at room temperature and were dissected and examined in the usual way after intervals of 7 days (two specimens), 9, 18, 20 and 24 days. The first four showed a moderate to heavy infection of the stomach with oocysts. In the one examined on the twentieth day were found mostly rupturing and ruptured oocysts and an intense invasion of the salivary glands with sporozoites —the form which is inoculated by the mosquito into the human host. The sixth specimen alone proved to be negative and in this one the condition of the ovaries suggested the explanation that this may have been due to the ingestion of only a small amount of infective blood.

On a second case of tertian malaria having a much fewer number of gametes, a single specimen of *A. punctipennis* was fed on November 12. Upon dissection on December 2, a light infection of both the stomach and glands was found to exist.

In each experiment bred specimens of *A. quadrimaculatus* were fed on the patients as controls and these also showed a high percentage of infections upon subsequent examinations.

The demonstration that *A. punctipennis* is an efficient host for tertian malaria does not necessarily indicate that it is an efficient carrier of other forms of malaria and, in fact, from Hirschberg's results we may anticipate that such is not the case.

The writer is indebted to Dr. C. C. Bass and Dr. F. M. Johns of the laboratories of clinical medicine of Tulane University for assistance in the work upon which this statement is based and to Mr. F. Knab for the verification of the determination of the mosquito.

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THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
SECTION G, BOTANY

PACIFIC COAST MEETINGS

The following officers were present: Professor W. A. Setchell, sectional vice-president; Professor L. L. Burlingame, acting secretary. The meetings were held in the Hearst Mining Building, University of California, with the exception of the meeting on August 4, which was held in the Botany Building, Stanford University. The following papers were read:

Tuesday, August 3

The Embryo of the Gymnosperms: Professor John M. Coulter, University of Chicago.

Attention is called to three features of Gymnosperms: the proembryo, the archegonium and the cotyledons.

Proembryo.—The proembryo presents every gradation from a tissue completely filling a large egg to such segmentation of the egg as occurs in Angiosperms. This series represents a progressive change extending from the Devonian to the present time. No better example of progressive evolution, or orthogenesis, can be found. The change is due to the fact that wall-formation begins earlier and earlier in the history of the embryo, thus restricting free nuclear division and limiting the amount of proembryonic tissue. The conditions that favor wall-formation and inhibit continued free nuclear division are unknown, but that this phenomenon is a response to some progressive change in conditions is evident.

Archegonium.—A similar series of progressive changes is shown in the development of the archegonium, extending from the appearance of archegonia at the full maturity of the gametophyte, through forms in which they appear earlier and earlier in the ontogeny of the gametophyte, and ending with the maturation of eggs at the free nuclear stage, resulting in the elimination of archegonia. The conditions for gamete-formation as contrasted with those for vegetative activity, are getting to be known through experimental work. This progressive change, therefore, is to be explained by the gradual earlier appearance of conditions for gamete-formation, which in general are conditions of minimum vegetative activity. In all probability, these are the conditions that also favor earlier wall-formation in the ontogeny of the proembryo.

Cotyledons.—Evidence is now at hand to prove that polycotyledony and dicotyledony are merely