ably with the way the subject is presented here in the University of California. Our first course is practically on the solar system, which is covered by the first volume, and our second course is on modern astronomy, which is undoubtedly covered by the second volume soon to be issued.

This first volume is extremely well done. The only adverse criticism I have to make is that it is not quite complete. Undoubtedly the second volume furnishes the material some of which I would like to see in the first volume. Even at the expense of a slight repetition of this material to be placed in the second volume, I would have had a chapter treating of the solar system in the sidereal universe. Such a subject, for instance, as "The Sun's Way" should not be omitted from a volume on the solar system. Space for such an additional chapter might well be gained by shortening the chapter on "Celestial Mechanics." Much of the subject-matter of this chapter is quite beyond the grasp of those for whom this work is intended and finds its more appropriate place in the "General Astronomy."

In connection with this chapter on "Celestial Mechanics" I can not refrain from mentioning the smile with which I read on page 275, "The calculation of an orbit from three observations takes a skilled computer two days or sometimes less. The novice may take as many weeks, most of his time being occupied in finding and correcting mistakes which are only too easy to make." With the last sentence I heartily agree, but would add that often these weeks of struggle are due to erroneous observations which, alas, are entirely too frequent. The first sentence of this quotation I would have written, "The calculation of an orbit from three good observations takes a skilled computer a few hours."

The book is well balanced and very up-to-date, as is evidenced by the introduction of such items as the pendulum observations in a submarine.

I am sure that the second volume, which will contain many subjects upon which Professor Russell is an eminent authority, will be of the same degree of excellence as this. The whole work will be not only a superb text-book, but also a regular authoritative handbook for the professional astronomer.

The authors have wisely followed Professor Young in giving numerous examples for the student to solve. A most welcome and valuable addition is the frequent lists of references.

I have noted a few very minor corrections which will be sent directly to the authors.

The book is well illustrated and beautifully printed.

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History of the Origin and Establishment of the Inquisition in Portugal. By ALEXANDRE HERCULANO. Translated by JOHN CASPER BRANNER. Stanford University Press.

DR. JOHN CASPER BRANNER, professor of geology in Stanford University for thirty years, and for three years its president, was for nearly half a century in one way or another connected with the Geological Survey of Brazil. In this capacity he acquired a very thorough knowledge of the Portuguese language, in which he published several important works.

After retiring in 1916 from active work in the university, Dr. Branner devoted himself mainly to writing, and among other things he made a translation of one of the most important of Portuguese historical works, Herculano's "History of the Inquisition."

Dr. Herculano gives a just and sane account of the most hideous period in the history of his native country, supported throughout by documents, and forming as a whole the strongest possible arraignment of the form of intolerance called religious, and of the beastly efforts to destroy heresy, current in the sixteenth century. It is much to the credit of modern Portugal that its scholars are free to tell the truth, which "Absolution" and "Patriotism" would like to conceal.

DAVID STARR JORDAN

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A MICRO METHOD FOR ESTIMATING THE RELATIVE DISTRIBUTION OF GLUTATHIONE IN INSECTS

HOPKINS[1] in 1921 isolated a constituent of cell protoplasm responsible for the nitroprusside reaction in animal tissues; this nitroprusside test had been previously applied by Heffter[2] and Arnold[3] in proof of the presence of a sulphydryl group (SH) in the cell. According to Hopkins, the substance which he isolated and named "glutathione" is a dipeptide and contains glutamic acid and cystein. This dipeptide is autoxidisable; it acts readily under varying conditions either as a hydrogen or oxygen acceptor, promoting cell oxidation and reduction under factors present in the tissues, and presumably has actual functions in the chemical dynamics of the cell.

During the writer's studies with arsenicals, the effect of the latter upon respiratory metabolism of insects indicated that in general the oxygen consumption and carbon dioxide production were profoundly

[1] Hopkins, *Biochem. Jour.*, 15, 286, 1921.

[2] Heffter, Med. Naturwiss Arch. 1, 81, Maly's Jahresb. 1908.

[3] Arnold, *Zeitsch. Physiol. Chem.*, 70, 300 and 314, 1911.

inhibited. It seemed therefore of considerable importance to determine the substance in the cells of tissues and organs singularly affected when insects are subjected to arsenical treatment. If glutathione has such tremendous function in cell activity as formulated by the above-mentioned workers and others, it was thought profitable to investigate its presence, distribution and reaction towards arsenic in insects.

For quantitative determinations of the presence of glutathione and the effect that arsenicals have upon the glutathione content of insects, the method used was the one described by Tunnicliffe[4] on the quantitative determination of glutathione in yeast. This method, however, necessitates the use of large quantities of material, and the results of these investigations will be described in a future paper.

Along with the above studies it appeared important to obtain a knowledge of the relative distribution of glutathione in the tissues and organs of an insect, and it was therefore found desirable to adopt the suggestions incorporated in the work of Heffter and Hopkins. As a result, a micro method for the qualitative determination of glutathione in insects was adopted by the writer in his investigations, as follows:

In a petri dish or similar receptacle a layer of paraffin about a centimeter thick is poured and left to harden; a little of the paraffin from the center of the dish is scooped out to form a depression for the reception of about 5 cc of a saturated solution of ammonium sulphate $(NH_4)_2SO_4$. The petri dish is then mounted on the stage of a binocular dissecting microscope and the insect to be tested is dissected in this fluid and the organs are carefully separated. This is best accomplished by removing them entirely from the body cavity, thus exposing the body muscles. The leg muscles may also be exposed by slitting the chitin. If the ammonium sulphate solution becomes discolored during the process of dissection, it can be siphoned off with a pipette and fresh solution added. After slitting the insect, it is very often best to heat it in a little dilute acetic acid for a brief period before placing in the ammonium sulphate solution. About four to six drops of a 5 per cent. solution of sodium nitroprusside $Na_2Fe(CN)_5$ $(NO)2H_2O$, is added to the ammonium sulphate solution, and afterwards about 1 cc of ammonium hydroxide. Upon the addition of the latter a very deep magenta color flashes up in the muscles and various parts of the organs, the brilliancy of the color lasting for several minutes. The observer, by noting the nitroprusside reaction in the various parts of the tissues and organs, obtains a fair knowledge of the distribution of glutathione in the insect body.

The writer made many observations on various species of insects with the following results. Normal insects subjected to the above procedure gave marked nitroprusside reactions in the muscles of the thorax, head, legs and alimentary tract. The coloration was especially brilliant in the stomach and in the sex organs during development, the brilliancy in the latter possibly being due to the active metabolism of the cells. Other observations were made upon insects which had been subjected to arsenical feeding or injected with arsenical dilutions, and the resultant nitroprusside reaction was compared to the intensity of the color reaction in insects under normal conditions. Such qualitative determinations have shown that 0.1 normal As_2O_3 when fed to insects through the mouth inhibits the nitroprusside reaction first in the stomach, then in the muscles of the thorax, head and sex organs. If a large number of insects are treated with arsenicals and observations are made at fifteen minute intervals, there is obtained a picture of a gradual lessening in the intensity of the nitroprusside reaction. As would be expected from such observations, insects that had been longer under the influence of arsenic showed but a faint nitroprusside reaction in organs and tissues normally giving a brilliant reaction.

A few typical examples may be cited from the large number of observations made.

Normal potato beetles (*Leptinotarsa decemlineata* L.) of both sexes dissected and tested for glutathione, as described above, gave brilliant nitroprusside reactions of the stomach, testes, ovarian follicles and the muscles of the thorax and head. The esophagus and hind intestine gave no reaction to nitroprusside. Potato beetles which were fed or injected with 0.1 normal As_2O_3, and examined five hours later, gave an exceedingly faint nitroprusside reaction of the stomach and muscles of the thorax and head, and no reaction of the ovarian tubules, testes or hind intestines.

Similar tests were made with *Popillia japonica* Newm. In this species the entire normal alimentary tract is usually filled with a dark brownish substance and it is therefore necessary to tease out the contents before the nitroprusside test is applied to the digestive tract. In other respects the reactions were similar to those described for the potato beetle.

In normal squash bugs (*Anasa tristis* DeG.) the entire digestive tract gives a nitroprusside reaction, the coloration being brilliant in the stomach and muscles of the thorax and head. Since in this species the sex organs are naturally orange color, it is not possible to observe the nitroprusside reaction.

In the red-legged grasshopper (*Melanoplus femur-rubrum* DeG.) the entire alimentary tract, except the crop, gave a nitroprusside test, the crop being naturally of a deep brownish color. The coloration is brilliant in the stomach, caeca and the muscles of the

[4] Tunnicliffe, *Biochem. Jour.*, 19, 194, 1925.

thorax, head and hind legs, ovarian follicles and testes, and faint in the upper part of the ileum. Grasshoppers which were fed or injected with 0.1 normal As_2O_3 and examined five hours later gave a very faint nitroprusside test in the alimentary tract, body and head muscles, and in the ovarian follicles and testes, but the hind leg muscles gave a brilliant nitroprusside test.

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SPECIAL ARTICLES

THE OILFISH,[1] RUVETTUS PRETIOSUS, AT BERMUDA

WHEN Mowbray (then of the New York Aquarium)[2] returned on January 12, 1925, from a holiday spent in Bermuda he brought with him a four-foot specimen of this rare deep-sea fish and presented it to the American Museum. This specimen had been taken on December 19, 1924, and being recognized as an unusual fish had been purchased by a friend of his and put in cold storage to await his coming. Although it had been in a refrigeration chamber for a month, the fish was in excellent condition when it reached the museum and it was at once photographed, skinned, a cast and later a mannikin made, and still later the prepared skin mounted.

This very interesting fish was first discovered in and described from that ichthyological treasure ground, the Straits of Messina, by Anastasio Cocco in 1829. Eight years later Cantraine took another specimen from the same waters, and being apparently ignorant of Cocco's previous determination, gave what is possibly the best description of the fish ever made, and the first if not the best figure ever drawn. The fish though rare has been repeatedly taken on the northwest shores of the Mediterranean and off the northwest coast of Africa, but records in our waters are few and far between. From this it will be understood that the capture of this relatively unknown fish is a matter of considerable interest ichthyologically. We have in manuscript a fuller paper dealing with the natural history, iconography, distribution and classification of the fish, but as there is no prospect of early publication of this paper, it seems best without further delay to make this faunal record of its capture.

This specimen of *Ruvettus pretiosus* was a spent male measuring four feet long between perpendiculars and weighing 24.5 pounds. It was taken on the night of December 19, 1924, in seventy-five fathoms, six miles east of Bermuda. Mowbray has obtained records of ten other specimens of *Ruvettus* taken at Bermuda, and it seems that if systematic fishing were carried on there for it, at least a fair number of specimens might be obtained. The data concerning these Bermudan specimens will now be set forth in categorical fashion.

The first Bermudan *Ruvettus* of which we have been able to get any data was taken on December 4, 1909. This fish was caught by Watson Lightbourn, while fishing for red snappers in sixty fathoms of water, on the Challenger Bank, eleven miles southwest of Bermuda. It was a male, six feet six inches long and weighed about fifty pounds. In December, 1911, four other specimens were caught by fishermen on the outer banks. Two were taken by Lightbourn on Argus Bank about twenty-five miles south-southwest of Bermuda in 125 fathoms. The largest was six feet eight inches long and weighed about seventy-five pounds. The other two were taken by Peter Anderson at the same time and place but in about seventy-five fathoms. One of these was a small fish, weighing only about twenty pounds—the smallest ever seen at Bermuda, and one of the smallest on record anywhere. Again on March 12, 1912, Lightbourn[3] took on Challenger Bank, another specimen, a female recently spent, weighing about fifty pounds.

No other captures are recorded for a dozen years, until December 19, 1924, when Stanley Pitcher on the pilot boat "Guard," six miles east of Bermuda, noticed large balls of phosphorescent light deep in the black waters at night. Catching up a fishing outfit he baited the hook with a piece of salt codfish and lowered down to about seventy-five fathoms. In a few minutes he hooked a fish which took him nearly an hour to land, and which, when it came to the surface, appeared to be surrounded by a large ball of blue fire. This fish, which was absolutely unknown to the fishermen of the East End, was the one kept in cold storage for Mowbray, and is the one whose skin now forms one of the treasures of the American Museum.

[1] The significance of the name "oilfish" has already been shown in a previous paper by Gudger, "A New Purgative, the Oil of the 'Castor Oil Fish,' Ruvettus." *Boston Medical and Surgical Journal*, 1925, Vol. 192, pp. 107–111. fig.

[2] Since this note was written, Mowbray has gone to Bermuda to take charge of the aquarium there. One of the various problems which he has slated for investigation is the natural history of *Ruvettus* and particularly the matter of its luminosity, to which reference will be made later.

[3] We regret to record the fact that this able fisherman, who has given Mowbray so much natural history data, was recently drowned while fishing.