with physical data such as stress-strain curves, a critical comparison of the theories of rubber hydrocarbon structure in the light of these results, and further x-ray studies of the rubber hydrocarbon crystals actually produced for these fractions at the Bureau of Standards.

GEORGE L. CLARK
W. J. WARREN

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF ILLINOIS

W. H. SMITH

BUREAU OF STANDARDS
WASHINGTON, D. C.

EFFECTS OF ENDOCRINE EXTRACTS ON THE EARLY DEVELOPMENT OF THE CHICK

THIS study was begun in the fall of 1930 as an attempt to analyze the effect of various endocrine extracts on the morphology of certain organs in the chick embryo and to see if it might be possible to bring about sex reversal. With a greater perfection of technique the studies are taking a decided trend toward sex reversal.

Two methods have been used in this work, the first of which was to inject extract directly into the allantois through the shell. This procedure has several disadvantages: the amount of material injected must be small, a piece of shell must be removed or the injections are not easily made until after about the sixth day of incubation, and lastly, the danger of infection is rather great.

The second method, and the one being used now, is essentially the one described by Hanan, Atwell and Hurd in their researches on the absorption of vital dyes by the allantois. These workers were able to show that in a large percentage of the cases trypan blue could be absorbed by the allantois from the air chamber of the egg as early as the fourth day of incubation. As much as 0.5 cc can be injected at that time. Their technique has been modified very little and it has been found that it is possible to inject twice daily over a period of days. By using the air chamber the amount of extract injected can be regulated better, the danger of infection is reduced to an insignificant factor and injections are made on the fourth day, which is approximately two days before the histological differentiation of the gonads.

A number of endocrine extracts have been used, but most of the experiments have been performed with Emmenin, Whole Pituitary, Antuitrin-S and Theelin. These have been furnished me through the kindness of Eli Lilly and Company and Parke, Davis and Company. The recent work has been limited almost entirely to the use of Antuitrin-S and Theelin. The major difficulty encountered to date has been the regulation of dosage. This obstacle led to a large number of fatalities in the early work, but it has been remedied in the later experiments.

The following results are presented as being indicative, but not with the idea that they represent in any sense completed work. Since it is not possible to analyze the experiments as separate units here, the results are given in summary.

Five hundred and sixty-eight embryos have recently been examined after having been treated with the extracts mentioned above, with the following results: 305 ♀ ♀; 170 ♂ ♂; and 93 unknown. The 93 unknown embryos died before sex could be determined. The percentage ratio is 64.3 per cent. females to 35.7 per cent. males. No attempt was made at selection of data. Both the earlier and later experiments were used in calculating these percentages, and as a result the number of unknown cases is high. However, even if all the 93 unknown ones are considered as males, the percentage of females over males would be 7.5 per cent., or 42 embryos.

If, on the other hand, the later experiments be considered as a unit, these having a much lower percentage of unknown cases, we find the following figures: 146 ♀ ♀; 69 ♂ ♂; and 15 unknown. If again we consider all the unknown as males, the number of females still exceeds the males by 62, or 27 per cent. Since all the extracts have fractions which affect the female reproductive system, the results appear significant. Also, there have been no experiments in which the ratios have not favored the females. Some male embryos have had asymmetrical testes. Accordingly, questionable gonads have been studied from histological preparations in order to prevent the possibility of interpreting these as ovaries. An interesting thing which has occurred is that the early fatalities, which come after sex can be determined, have been predominately of female embryos, running as high as 83 per cent. in the recent experiments. The experiments with Theelin offer additional evidence against the possibility of all the early deaths being of male embryos. To illustrate, the first three Theelin experiments are examples:

Experiment	I	25 ♀ ♀; 14 ♂ ♂;	11 unknown.
Experiment	II	24 ♀ ♀; 13 ♂ ♂;	13 unknown.
Experiment	III	34 ♀ ♀; 14 ♂ ♂;	2 unknown.

As can be seen from the figures, the dosage was regulated best in Experiment III, and it would appear that the preponderance of females was increased by the addition of members constituting the unknown class in Experiments I and II. The Antuitrin series give similar results.

A large number of eggs have been injected with

salt solution to serve as controls and in these the sex ratio has been 52 per cent. ♀ to 48 per cent. ♂. The work is now being continued, using eggs from a barred, non-barred cross so that sex-linked factors may be used as a check. Additional Leghorn eggs are also being used to increase the data from a statistical point of view.

W. R. BRENEMAN

INDIANA UNIVERSITY
OCTOBER 13, 1933

THE NATIONAL ACADEMY OF SCIENCES. II

Thermal overflows, thallophytes and rock building: WILLIAM ALBERT SETCHELL. Thermal springs are of wide occurrence over the world, and thermal overflows of water charged with calcareous or with siliceous salts are particularly noteworthy because of the presence of thermal thallophytes and their relation to deposits of sinter, both calcareous and siliceous. The thallophytes exhibit their most conspicuous formations and associations in the warmer portions of the overflows, but there are some noteworthy representatives at about the limit of the thermal and the cooler portions of the overflow. The unicellular thallophytes not forming colonies do not need special mention. Those forming colonial aggregates of some size are not associated with rock building. One colorless filamentous species excretes crystalline sulfur in the hottest portions of calcareous overflows, but no lime, while those inhabiting siliceous waters are devoid of any mineral deposit. The filamentous species of the warmer portions of the overflows containing chlorophyll surround themselves with jellies and the gelatinous masses, firmer or softer, may be associated with the laying down both of lime and of silica, but in varying degree. Certain species seem to have no association of this sort. Some species show slight participation, and one species shows a very decided relation to sinter formation, both calcareous and siliceous. In the cooler portions of the overflows, a single noteworthy species occurs in broad bands or patches of a seal-brown color. In calcareous overflows, lime is laid down in crumbly masses, within the layer of the individuals of this species, while in siliceous waters the sinter separates out as glassy tubes about each filament, but within the firmly gelatinous outer coverings. Since deposition of sinter seems to occur, at least in thermal overflows, only in connection with photosynthetic (*i.e.*, green) thallophytes (or Algae) and since only certain of these are thus associated, there seems possible an active (not passive) relation between certain Algae and rock building, as well as a certain specificity as to the species concerned. The various forms assumed by the jellies of these active aggregates affect and control the external forms as well as the internal structure of the sinters laid down.

Quantum relations in photosynthesis with Chlorella: B. M. DUGGAR, J. F. STAUFFER and FARRINGTON DANIELS. Quantitative measurements have been made on the utilization of carbon dioxide under the action of monochromatic light of measured intensity; likewise, by comparison, of polychromatic light. Light from a mercury arc of high intensity was passed through a monochromator or filter and thence through a stirred suspension of Chlorella. The incident and the transmitted light were measured with a thermopile. The change in oxygen and carbon dioxide of the gas passed through the exposure cell was measured with a special burette. Successive determinations were made in the presence and absence of illumination. When the rate of carbon dioxide assimilation was directly proportional to the light intensity, 0.06 of a molecule of carbon dioxide reacted per quantum of light absorbed. This value of the efficiency of the cell is considerably less than heretofore reported by other investigators.

Some problems in cellular pathology as approached through studies both of crown gall and related pathological growths of plants and of cell-stimulating bacteria: A. J. RIKER (introduced by L. R. Jones). A study of several physiological problems involved in cellular pathology and related to atypical and pathological growth are being approached through the use of easily manipulated plant materals. Examinations have been made of certain physiological changes induced in known substances by cell-stimulating bacteria, including *Phytomonas tumefaciens* (Smith and Town) Bergey *et al.* The ability of single-cell cultures to utilize various sources of carbon and nitrogen has been studied. Quantitative determinations have been made of some of the metabolic products from glucose. Changes in hydrogen-ion concentrations have been found to depend on the composition of the substratum. The plant extracts used were turned alkaline. The oxidation-reduction potentials became more negative in a variety of media. However, crown galls of tomatoes were more positive than contiguous uninfected tissue. Causal relations between either the metabolic products or the physical chemical changes following bacterial action and cell-stimulation are difficult to demonstrate because a large number of factors may induce cell proliferation. Two aids in this direction have been found and are being applied to various working hypotheses. (1) Inoculations with crown-gall bacteria on tomato were followed by galls at 28° but not at 30° C., although host and parasite grew well at both temperatures. (2) From a single-cell parent, sister cultures have been secured, one of which has lost its pathogenicity.

The prolonged activity of momentarily stimulated nerves: G. H. PARKER. According to conventional neurophysiology a nerve when severed from its center and momentarily stimulated is supposed to respond by momentary activity, as is well shown in the single twitch of the attached muscle when a severed motor nerve is subjected to a single electric shock. Such momentary activity does not seem to characterize chromatophoral nerves. When such a nerve in the tail of a catfish is cut, its effectors, the melanophores, spread their pigment and a dark band appears over the area of the tail controlled by the cut nerve. This band may persist for as