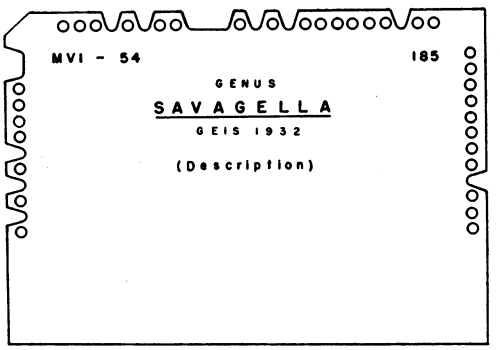

Fig. 1. Punched card of the genus *Savagella*.

Figure 1 depicts the punched card of the genus *Savagella* of the class Ostracoda. There were 48 holes around the edge, 14 of which are shown punched out. Each hole signifies a characteristic of the Ostracoda, and those holes that have been notched show the characteristics of the genus illustrated. Such morphologic criterions as type of hinge, overlap, ornamentation, and dimorphism are included, and the geologic range is also indicated. By using a steel rod and inserting it through a pack of punched generic cards, the cards having the feature picked will fall from the rod. Other diagnostic feaures may then be used until only a few cards remain, facilitating the identification of the specimen.

I have applied this method toward identifying the ostracods and have utilized statistical data obtained from the cards in analyzing their development during the Paleozoic era [master of science thesis, Michigan State College, 1952]. The evolution of hinge, overlap, and various ornamental aspects may be plotted with respect to geologic time or with one another. This greatly shortens a time-consuming process and allows for a more complete analysis of the factors affecting the Ostracoda.

The use of punched cards for identification and analysis certainly is not limited to micropaleontology or to paleontology in general. This method may be applied to all forms of taxonomic systems and, through the use of punched-card equipment, complete catalogs of classes of organisms could be maintained.

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16 September 1954.

A Method for Rapid *in situ* Demonstration of the Thymus and Other Tissues with High Nucleoprotein Content

The importance of considering the thymus as a functional organ throughout life was stressed in a previous communication [V. P. Simmons, *Pediatrics* 5, 574 (1950)]. However, it is seldom seen or recognized today in other than immature laboratory animals or children largely because of the fact that it blends in so well with the fat that envelops it and because the individual lobules are not always in sufficiently close apposition to provide an easily visualized continuum. This difficulty can be quickly and dramatically overcome by fixing the thymus either *in situ* in an anesthetized animal to show its normal relationships or by removing the contents of the entire thymic area and fixing them *in vitro*. The animal is necessarily sacrificed following either of these procedures. Unfortunately, potent fixatives cannot be applied very readily in the living animal without the functional destruction of tissues vital to existence.

Although other fixatives are also effective, Carnoy's solution (absolute alcohol 6 parts, chloroform 3 parts, and glacial acetic acid 1 part) has been found to be quickest acting and very rapidly penetrating.

The solution can be sprayed or poured on, or the tissues can be removed and immersed in it. Surface fixation is accomplished in seconds; the individual lobules become white and are sharply outlined against the surrounding tissues, which are either fatty or less richly endowed with nucleoprotein (see Figs. 1 and 2). Lymph nodes are quickly fixed in the same manner, but their appearance is so different from that of the

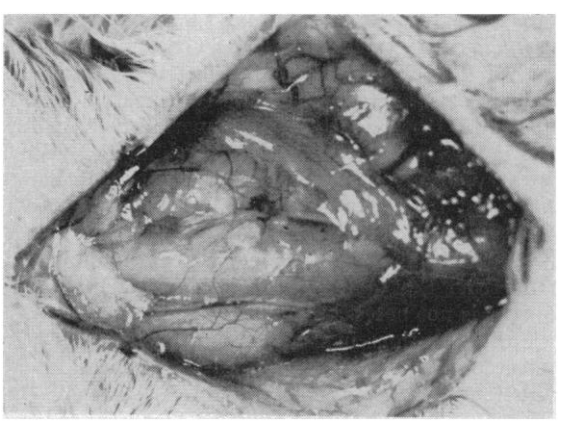

Fig. 1. The normal thymic area exposed in a living, anesthetized male guinea pig weighing 400 g.

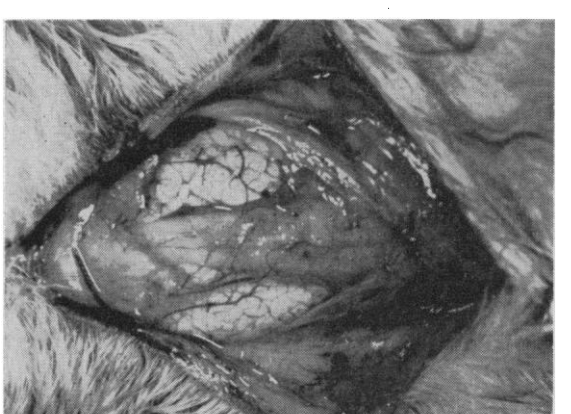

Fig. 2. The same area following the application of Carnoy's solution. The thymic tissue appears white.

thymus that difficulty in differentiating the two tissues does not arise; often one can grossly distinguish the surface lymphoid follicles in the nodes.

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29 July 1954.

Plastic Chamber for Inert Atmospheric Work

The determination of physical constants of materials that are sensitive to the atmosphere requires expensive and elaborate equipment. We have designed an inexpensive dry-box that can be used to determine the refractive indices of materials that are oxidized by atmospheric oxygen. To make these determinations, an Abbé refractometer must be enclosed in an atmosphere-tight container having the visibility necessary for efficient operation of the instrument. Commercially available dry-boxes are unsatisfactory for this specialized purpose because of size, cost, visibility, and weight. Polystyrene was used to construct the dry-box shown in Fig. 1 because it would provide the desired properties of the container and retain ease of construction.

A cement made of polystyrene dissolved in trichloroethylene was used to join the component parts, ½ in. polystyrene base, 12.5 × 18 in., ¼ in., polystyrene sides, 9 × 12 in. and 9 × 18 in., and 0.01 in. polystyrene top. The water, electric, and nitrogen inlets were sealed with the same cement. The glove ports were made by bending with heat a 2 × 17.5 in. strip of ¼-in. polystyrene around a pipe. To make bends in the thin polystyrene to form the top, the seams were moistened with trichloroethylene to soften the plastic. Any leaks that may be detected are readily sealed by application of the cement.

The use of this box was found to be quite satisfactory. The refractometer scale could be read with ease through the top, and the box was sufficiently light to be moved even with the refractometer inside. Some leakage occurred at the glove ports, but this was not critical, if the pressure inside the box was kept greater than atmospheric pressure. A sheet of aluminum foil on the bottom of the box prevented spilled organic liquids from softening the plastic. For the removal of traces of oxygen remaining after sweeping the dry-box with an inert gas, a weighing bottle containing a glass-wool wick saturated with tri-n-butylborane, a substance that is readily oxidized, was opened. Materials were introduced into and removed from the dry-box through the glove ports.

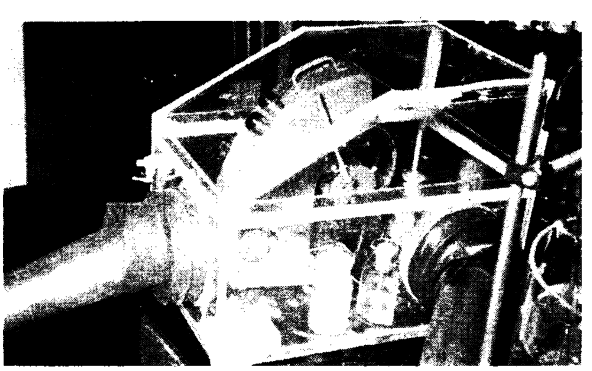

Fig. 1. An apparatus for determining refractive indices in an oxygen-free atmosphere.

With slight adaptations the box could be used for containing other pieces of apparatus or for work in an anhydrous atmosphere.

I wish to express appreciation for the technical assistance of Helmut Haendler and Walter Eldredge and for advice received from the Plax Corporation of Hartford, Connecticut.

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24 September 1954.

On Column Chromatography of Sugars

The use of carbon (*1*) and cellulose (*2*) columns has become widespread for the separation of carbohydrates of comparatively low molecular weight. It is therefore desirable to point out several factors of importance in the general use of such columns.

When using carbon columns made of any of a variety of charcoals, we have found it expedient to give the column a preliminary wash with dilute hydrochloric acid solution in order to assure the removal of basic ash, which might otherwise cause some isomerization of the sugars applied later. A 1 percent hydrochloric acid solution is sufficient. The acid is then removed from the column by washing with distilled water. Celite (*3*) is usually mixed with finely ground charcoals (*4*) to increase flow rate. However, celite sometimes dissolves in the developing solutions and is obtained as a flocculent precipitate in the concentrated effluence. Celite can be removed from the concentrated effluence by filtration through a bacterial filter or by evaporation of the solution to dryness and redissolution of the carbohydrate in water. To avoid this inconvenience we often use columns composed entirely of charcoal. The charcoal selected is that which passes a 40- or 60-mesh screen but is retained on an 80-mesh screen. This produces a column composed entirely of charcoal and consequently increases sorptive capacity of the column.

Often in the use of cellulose columns, carbohydrates other than those placed on the columns are observed in the eluates. These extraneous carbohydrates arise from the cellulose or disintegrated filter paper employed to pack the column. The cellulose used is, of course, not chemically pure but represents a purified pulp that still contains a small amount of hemicellu-