them. The pronghorn antelope, first described in 1818 by George Ord, an early president of the academy, formerly ranged the entire country west of the Mississippi, their total number being placed at 40,000,000; now dwindled to perhaps 15,000.

In Siam, the permanent field staff, organized in 1928 by Rodolphe M. deSchauensee, a trustee of the academy and associate curator in the department of vertebrate zoology, is continuing the work of three earlier expeditions. With headquarters in Bangkok this collecting of birds, fishes, reptiles, insects and mammals extends into every part of Siam. To date the specimens received include some 4,500 birds, 6,000 fishes, 300 reptiles, 400 butterflies, 500 insects and 100 mammals. Among these are a number of new species.

Frank B. Foster, a trustee of the academy, planned to leave Philadelphia early in August for the Kenai Peninsula, Alaska, where he hopes to secure a bull moose of unusual size for a striking one-animal "group" in the North American Hall.

Dr. W. M. Benner, research associate in the department of botany, is collecting a general series of plants found in the more remote mountain regions of Texas, Arizona, New Mexico, California and Colorado. Among the objectives of his expedition will be the dwarf willow tree, only four to five inches high, which completes its seasonal activity in a few weeks; Alpine timothy a few inches high, which heads in an equally brief period and other plants that spring up as soon as the snow line recedes.

In the high plateau of central Mexico, Dr. Henry A. Pilsbry, curator of mollusks, and Dr. Francis W. Pennell, curator of botany, accompanied by Cyril H. Harvey, of Atlantic City, are collecting mollusks and plants, under a grant from the American Philosophical Society. The work of this expedition will aid in completing a chart of the route taken by mammals, mollusks, insects and plants which, over a period of some 3,000,000 years, moved northward from South America when the Isthmus of Panama was lifted above the waters 20,000,000 years ago.

For a three-months exploring and collecting trip along the west coast of Greenland, and as far north as Ellesmere Land, an expedition sponsored by R. R. M. Carpenter, of Wilmington, Delaware, a trustee, is now skirting the coast of Labrador in Captain Bob Bartlett's schooner *Morrissey*. The party is led by William K. duPont Carpenter, and includes Harry J. Lance, Jr., of the staff, Robert F. Dove and a representative of the Canadian government.

The object of this expedition is to secure specimens of birds and animals, and to collect fishes and other sea animals. It also is hoped that some definite information may be obtained as to the nesting and breeding habits of the greater snow goose and the common brant, two birds which summer in Arctic lands and in the autumn migrate southward to North Carolina, and even as far as Cuba. Thus far little is known about the summer life of these birds. The expedition will visit Cape York to inspect the Peary monument erected there last summer, then proceed to Ellesmere Land, where it is hoped specimens of Peary's caribou, a rare and striking white species, may be photographed or secured.

To continue the excavations near Clovis and Carlsbad, New Mexico, which last year revealed impressive indications that man lived in North America perhaps 15,000 years ago, the joint expedition for the academy and the University Museum of Philadelphia is working under the direction of Edgar B. Howard, research associate in the department of vertebrate zoology, who will be joined later by Ernst Antevs, geologist of the Carnegie Institution of Washington. Thus far the facts represent the association of the bones of extinct animals with human artifacts, and the search now is being intensified with the hope of finding human bones.

James Bond, research associate in the department of vertebrate zoology, on his eighth expedition to the West Indies, for a representative collection of birds, has added a number of species to the already extensive collection he has secured for the academy.

On a recent expedition to Louisiana, Edward Woolman, accompanied by Wharton Huber, associate curator of the department of vertebrate zoology, collected small mammals and birds, and secured moving pictures of the large numbers of blue geese that winter in that part of the United States.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

PHOTO-ELECTRIC TECHNIQUE FOR THE COUNTING OF MICROSCOPICAL CELLS

THE technique of progressive dilutions used by early bacteriologists to isolate species and to estimate the probable number of cells is still applied in the determination of quanta of viruses, bacteriophages and enzymes.

The isolation and counting of bacterial and fungic species have been so simplified by the introduction of solid culture media, differential stains and micromanipulation that the dilution technique, which in part is embodied in the standard plate count method, is no longer carried to its final point: *e.g.*, one organism per dilution bottle.

The following is a brief description of an attempt to

adapt photoelectric methods to the direct counting of microscopical cells in suspension in water.

A capillary glass tube, made from a small tube elongated over a gas flame, is placed under the high magnification field of a microscope. The microscopical cells in suspension in water (red blood cells or neutral-red stained yeast cells) are forced under pressure to circulate through the capillary tube. A photoelectric apparatus of the smaller type is adjusted to the microscope's ocular and connected with an appropriate meter. The purpose of the experiment is to have each microscopical cell passing through the capillary tube, register itself automatically on the photoelectric apparatus, thus creating a micro-current which can be amplified and recorded.

The technical difficulties to overcome in such an experiment can be listed as follows:

(1) Difficulty to standardize capillary tubes in such way as to fill exactly the highest magnification field.

(2) Difficulty to flatten capillary tubes (as suggested by Sturges in his studies on bacterial motility) to insure proper focus.

(3) Necessity to shake dilution samples thoroughly to prevent clumping of cells in capillary tubes.

(4) Desirability of a specific photoelectric apparatus highly sensitive to microscopical objects. The ordinary commercial photoelectric apparatus is not built or intended for such purpose and shows only a faint reaction to magnified erythrocytes, neutral-red stained yeast cells or microscopical solid particles.

ANDREW MOLDAVAN

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A NEW SOURCE OF ILLUMINATION ADAPTED TO PHOTOGRAPHY AND LOW-POWER MICROSCOPY

AN adaptation of the so-called neon type of tubular light has given promise of furnishing satisfactory illumination both for the photography of small opaque objects and for the binocular microscope stage. The apparatus is made in the usual arrangement used for the neon type, namely, glass tubing filled with a combination of gases, which may be varied to control the spectrum range. A step-up transformer on the 110-volt lighting circuit supplies a potential of 2,000 or more volts across electrodes fused into each end of the tube. For the purposes mentioned the glass tube was shaped into a number of close, circular turns, forming either a single or double spiral. For use with the microscope a spiral of three turns has been found satisfactory, but for photography a larger number is more desirable to furnish as much intensity as possible. When in use the lighting unit is placed around the binocular microscope objective, about two inches from the object, or around the camera lens so that the photograph is made through the opening in the center of the unit. The inside diameter of the unit should be not less than two inches. A sleeve extending inside the light and fitted to a reflector back of the light shades the objective or camera lens, as well as increasing the efficiency of the apparatus. An arrangement to cover a variable sector of the unit allows control of the intensity and angle of the shadows so that perspective may not be lost.

This type of lighting is particularly advantageous because of the absence of intense heat, which would be detrimental to lens mountings or to the objects. The intensity of the light source is very even over all its area, so that even lighting of the object is obtained with no manipulation, and it is very easy to control the shadow intensity to suit the subject. Also there is no flare, such as is found in some forms of incandescent lighting. The cost of this type of unit is under ten dollars.

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LANTERN SLIDES ON "FROSTED" GELATINE

SEVERAL communications relative to the use of Cellophane as a vehicle in the making of lantern slides have appeared recently in SCIENCE. With our aluminum-surfaced screens we find an undesirable glare develops even when yellow-tinted Cellophane is used. Furthermore, unless great care is taken, Cellophane does not take ink uniformly and exactness in delineation is sometimes sacrificed by this effect. Where compass work is required, however, Cellophane is far more convenient than commercial slides of clear or "etched" glass.

In searching for substitutes for Cellophane which will eliminate the difficulties mentioned we have found that *thin*, translucent, onion-skin paper is excellent. Colored inks provide for differentiation in diagrams when desired.

Better than the paper is a "frosted"—the trade term—gelatine sheet for flood lights by Klieg. When ink is applied to the matte surface of this sheet the roughening particles appear to dissolve, coalescing into a smooth, transparent surface when dry. Lines then appear in color on a gray background when projected. A startling fact is that perfectly white lines appear on the gray surface when drawn with plain water. With ink or water the change to transparency is immediate, drying almost as rapid, so that the slide works up very quickly. Details may be worked in with lead of pencils when required.

We have found that the gelatine sheets offer only one disadvantage—they are so sensitive to contact