sence of thirteen months during which he served as agricultural adviser to the Government of Iran. He helped to reorganize the Iranian Department of Agriculture. Part of his work was to establish a Bureau of Forestry. He also assisted in the solution of problems of irrigation, soils, transportation and colonization.

IN the address as president of the American Chemical Society of Dr. S. C. Lind, printed in the last issue of SCIENCE, on page 230, column 1, third paragraph, the second line from the bottom, the number 450 should be 4,500.

THE Clinical Congress of the American College of Surgeons will be held in Chicago from October 1 to 25.

MEMBERS of the Optical Society of America are invited to visit the following exhibits arranged by the industries of the city and the University of Rochester during the twenty-fifth annual meeting that will be held on October 3, 4 and 5. These include Eastman Kodak Company, Thursday, 2:00 P.M. A tour of the Kodak Research Laboratories including the Departments of Radiology, Sensitometry, Photometry, Microscopy, Photomicrography; Motion Picture Studio; Special instruments—Microdensitometer, Recording Spectrophotometer, Electron Microscope. The University of Rochester, Thursday, 9:30 P.M. Department of Physics—Cyclotron; Institute of Optics—Measurement of solar radiation, determination of ozone in the atmosphere. The Taylor Instrument Companies, Friday, 1:00 P.M. Luncheon followed by a trip through the plant. Inspection of manufacture of—Thermometers, Barometers, Compasses, Industrial Control Instruments. The Bausch and Lomb Optical Company, Friday afternoon. Plant visit and Instrument Display.

A LARGE collection of birds from Indo-China has been sent to the Smithsonian Institution by Dr. Joseph F. Rock, American botanist and ethnologist. The collection includes three specimens of the giant ibis. Dr. Rock was able to obtain a fine collection of the larger birds of the area. These included marabou storks, herons and other water birds. Among the smaller specimens are representatives of several species unknown until they were found by a Swedish expedition in the same area within the past few years. The collection contained nearly eight hundred specimens.

AT the beginning of the two hundred and fortieth year of the founding of Yale University, Silliman College, completing the group of ten undergraduate colleges, as originally planned, was opened on September 23. It is named for Benjamin Silliman, professor of chemistry and geology from 1802 to 1853. The building stands on the block bounded by College, Grove, Temple and Wall Streets. It includes the former Vanderbilt dormitories, given by the late Frederick W. Vanderbilt, of the Sheffield Scientific School class of 1876, and Byers Hall, given in memory of Alexander MacBurney Byers, of the Sheffield School, by members of his family. There are accommodations for 250 students, five resident fellows, rooms for visiting alumni, a dining hall, student common rooms and library. Professor Filmer S. C. Northrop, professor of philosophy and member of the Yale faculty for seventeen years, has been appointed master of Silliman College.

CORNELL UNIVERSITY has awarded forty-four John McMullen Regional Scholarships in Engineering to entering students from twenty-two states. The number is larger than usual this year because of a new ruling by the Board of Trustees giving the faculty committee authority to vary the stipends within limits in order to meet the specific needs of the applicants. The majority of the scholarships, however, carry $400 a year during the entire four- or five-year course in the College of Engineering. These scholarships are awarded annually to secondary school graduates in 15 districts covering the United States except the State of New York, where other scholarships are provided. They are financed from the proceeds of the fund established by the late John McMullen, of Norwalk, Conn., "for the purpose of creating and maintaining free scholarships for the education of young men as engineers." Industrial scholarships, undergraduate scholarships and graduate scholarships are also supported from this fund, which now amounts approximately to $2,000,000.

Nature states that the British home secretary recently announced in the House of Commons that he is willing to consider steps to enable alien men of science who are not released from internment to carry on their scientific activities or studies in internment.

DISCUSSION

RHESUS MONKEYS (MACACA MULATTA) FOR AMERICAN LABORATORIES

THE Bureau of Biological Survey issued permits for the following numbers of Rhesus monkeys to be imported into the United States mainly for scientific laboratories: 1936: 12,992; 1937: 12,421, 1938: 15.851. Thus the actual average monthly importation from 1936 to 1938 inclusive was about 1,144, less mortality during shipment from India.

These figures show the magnitude and importance

of the trade in Rhesus monkeys for the many kinds of medical and other scientific research. The data also show that previous estimates were exaggerated which gave the numbers of monkeys imported as being between 30,000 and 50,000 per annum.

Assuming that these primate specimens are essential to the work of American investigators, two important questions arise: 1. Will this drain on the Rhesus monkey population seriously limit or in fact deplete the supply in India? 2. Since various embargoes have been imposed during recent years, is there a possibility of serious limitation which would curtail important scientific research?

I tried to find the answers to these questions when I was in India and the Far East during July, August and September, 1938, collecting a breeding stock for the Santiago Primate Colony of the School of Tropical Medicine, Puerto Rico and Columbia University.

A clear and unequivocal answer was found to the first question: The center of the trapping operations is in the district around Lucknow where Rhesus monkeys are ubiquitous, are found by the hundreds of thousands and are even considered as pests. Throughout great sections of India where no trapping is being done at present, Rhesus monkeys are found in large numbers. The bonnet macaques in Southern India constitute a further possible supply. The Government of India has at times caught animals in the farming plain districts and shipped them by carloads to forest districts in order to protect the crops of fruits and grains. Since the monkeys are very numerous, since they are prolific breeders and since, in the main, only juvenile animals are trapped for export, there is no question of extinction from trapping or even of serious limitation of the supply.

The second question is problematic. Monkeys in India are considered to be quasi-sacred by Hindus and Buddhists. These peoples resent their capture and export under the prevailing deplorable conditions and they are told that the monkeys are used for the "rejuvenation of decadent Westerners." The Society for the Prevention of Cruelty to Animals, both in America and India strives to prohibit this primate traffic. These pressure groups succeeded in having the following resolution adopted by the Government of India in 1937:

> In exercise of the powers conferred by Section 19, the Sea Customs Act, 1878 (VIII of 1878), and in supersession of notificaion of the Government of India in Financial Department (Central Revenue) No. 23 Customs, dated the 3rd of April, 1937, the Central Government are pleased to prohibit the export of monkeys by sea or by land from British India during the period from 1st of April to 31st of August in each year.

Furthermore, the Coaching Tariff No. 11 of Indian railways prohibits the carrying of monkeys during the stated season. Exceptions are made for the School of Tropical Medicine, London.

The season of prohibition is delimited to April through August because of the high temperatures prevailing in India at that time in consequence of which many monkeys suffocate during rail shipment to coast ports. No consideration has been given to the fact that specimens shipped from India during the late fall and early winter months arrive about 40 days later in the often severe cold winter of Boston or New York, where most freighters from India first dock. Nor has consideration been given to the climatic zones of the Red Sea or the Cape of Good Hope through which shipments must pass.

Even during normal peace times, shipping problems are acute. Animals are packed in bamboo cages for rail shipment to Calcutta or Bombay. During these journeys a high percentage (estimated 10–20 per cent.) are either killed in fights, severely wounded or die from suffocation or the lack of water. Most animal depots in the seaports are filthy and monkeys are exposed to the disease-carrying humans usually found around these depots. The conditions under which animals make the 40-day journey to the United States are in most cases equally deplorable. Most ship operators do not like to carry this live freight and many have rules against its transport. At present shipping space is in great demand and invariably officers of ships must receive heavy gratuities to get them to tolerate the nuisance of shipments of monkeys. Since no ships have adequate accommodations for live primates, they fare poorly and from 6 to 40 per cent. die on shipboard. In addition, shipping charges are deliberately made high in order to discourage shipment of these primates.

All those interested in bettering these conditions; the scientists who use them, the Hindus and Buddhists, the Society for the Prevention of Cruelty to Animals and conservationists, should have a common interest in working out feasible plans for providing near optimum shipping conditions for these monkeys. A study of the problem indicates that proper approach to the Government of India, to the shipping officials and to dealers would greatly improve conditions affecting this necessary import of primates.

It should also be noted that a small percentage of the Rhesus monkeys necessary for American laboratories could be supplied by breeding colonies such as the Santiago Primate Colony in Puerto Rico. There is no reason why some specimens can not be bred near centers of adequate food supplies in southern and southwestern United States. The possibility of substituting New World platyrrhine types for the Rhesus should receive due consideration, also.

Study of the problem leads me to suggest the following:

1. The entire problem should be more carefully studied by a government agency or foundation before serious shortages occur.
2. A diplomatic approach should be made to the Government of India through the United States Consulate in Calcutta, requesting their cooperation.
3. Trappers and shippers in India as well as importers in the United States should be licensed and compelled to meet certain stated requirements.
4. All Rhesus specimens leaving India should be tested for tuberculosis and the positive reactors eliminated.
5. A study should be made of the need for these primates and this demand should be coordinated throughout the year with trapping operations in India.
6. Agreements should be made with shipping lines which will handle this traffic so that they will provide shipping facilities and adjust their charges accordingly.
7. Shipments of monkeys should be accompanied by trained caretakers.
8. Shipments should be timed and routed taking into consideration the weather conditions prevailing at various times of the year and the effect on Rhesus shipments. The Red Sea should be avoided at certain seasons (after the Mediterranean is again open) and during severe winter weather, shipments could be sent to the West Coast or to Southern ports, *e.g.*, New Orleans, instead of Boston and New York.
9. An adequate balanced ration and not solely unhulled rice should be required for animals during shipment.
10. Rhesus monkeys could be purchased directly from reliable agents in India at a considerable saving to scientific laboratories.
11. Breeding colonies for a limited number of disease-free, selected, dated and conditioned specimens should be established in the United States or nearby in the Western Hemisphere.
12. Consideration should be given to the possibility of using the New World platyrrhine monkeys in experiments where they can be substituted for the Rhesus monkeys.

Assuming that a supply of Rhesus monkeys or of other *Macaca* is essential for American laboratories, some of these recommended steps would seem highly desirable if not imperative.

C. R. CARPENTER

SCHOOL OF TROPICAL MEDICINE,
COLUMBIA UNIVERSITY

MUSCA DOMESTICA AND HIPPELATES FLIES—VECTORS OF BOVINE MASTITIS

RECENT work at the Florida Agricultural Experiment Station on transmission of bovine mastitis shows that at least two species of insects, namely, the common housefly, *Musca domestica,* and frit flies or eye gnats, *Hippelates* spp. to be important vectors of the infection. Close observations made on diseased animals in affected herds showed that *M. domestica* were persistent in their feeding habits at the teat orifice of lactating cows in the milking line and of cows corralled near the barns. They fed on waste milk accidentally spilled on floors during milking operations. *Hippelates* were noted to hover around the natural body openings of calves, yearlings, pregnant heifers and lactating cows. *Hippelates* fed on lacrimal fluid, fatty body secretions, milk droplets accidentally spilled on the feet and on secretion at the tip of the teat of animals in herds where mastitis has prevailed. Structural characters, breeding habits and feeding activities of *M. domestica* and *Hippelates* flies aroused suspicion that these insects could serve as ideal vectors of mastitis.

Exposure tests were made to ascertain the possible relation these species might have to udder infection by their feeding habits at the teat orifice. The insects were taken from herds where mastitis has prevailed. In some instances alternate feedings on infected material and the teat orifice were made, while in other instances the teat orifice was exposed to insects taken directly from premises where mastitis prevailed. Mastitis developed in each of the experimental animals by the exposure technique employed. The type of udder infection, whether temporary or permanent, depended upon several factors. Active infections developed where the udder secretion was allowed to remain in the quarter as occurs naturally during the drying-off period prior to calving. Under natural conditions *M. domestica* and *Hippelates* fed simultaneously at the teat orifice of animals in corrals and many exposures were effected throughout the day during the insect season. While this work points out importance of insect transmission of bovine mastitis and opens up new fields of investigation it does not convey the idea that mastitis may not be transmitted by other means. Since *Hippelates* have previously been incriminated in the transmission of conjunctivitis and yaws (*frambоesia tropica*) in humans it would not seem unreasonable to suspect these insects serve as vectors of other infections such as Brucellosis in cattle *via* the conjunctivae, mouth, teat orifice, vagina and skin. Buchli has shown these routes to be the portals of entry of *Brucella abortus* in cattle.

D. A. SANDERS

FLORIDA AGRICULTURAL EXPERIMENT STATION

EVIDENCES OF PLEISTOCENE CURRENTS IN PENINSULAR FLORIDA

THE Aero Service Corporation in Philadelphia have recently completed, on a scale of 1:40,000, an aerial survey of the southern third of the peninsula of Florida. The photographs had been assembled on a rough mosaic basis on great boards, and matched with a remarkable degree of accuracy. Southeast of Lake Okeechobee the small lagoons were arranged along