tutions are able to support the researches of only one of the abler men in a department, this is not so of the larger endowed institutions nor of any of a dozen state universities. While on certain problems co-operative research by a group under the leadership of one man is the best line of approach, it is seriously to be questioned whether in general the advance of knowledge can be furthered in this manner as well as by the more independent operations of a group working, however, in intimate contact. Although there are occasional men of genius among the leaders, the great complexity of modern science makes it questionable whether any one such man is going to be able adequately to direct researches over a broad domain. In fact, there is a great danger in putting, so to speak, "all one's scientific eggs in one basket." Finally, from the viewpoint of students whose study is for one reason or another confined to a given university, the concentration of research in one general field is a disadvantage, and where a single leader has to direct the researches of some thirty graduate students the situation becomes impossible.

If one examines the situation in such leading research centers of physics as California, Chicago, Harvard, Johns Hopkins, Michigan, Princeton, etc., one finds that the *group* is the productive unit, and that *no one man* is directing the researches, even though one man may be primarily responsible as the administrative head and organizer of the group. In fact, we differ so far from Professor Williams as to believe that the road to the best results lies in the direction of *assembling a group of able productive men, each active in directing the research of graduate students.*

The chief cause of our failing in research, as partially indicated before, we attribute primarily to the dearth *in the past* of able, original, well-trained men. This, in turn, is due to our rapid expansion and to disregard of the importance of research on the part of the public, resulting in the failure to support it adequately or to draw into it the best talent. It is a universal comment of distinguished foreign scientists who visit us, "We do not understand how you are content to work with so little *research assistance,* so little domestic help in your homes and so little public recognition."

In conclusion we might suggest that the policy of a large university in building up good research departments should not necessarily be to get "lustre names" to organize and direct their researches (there are all too few of these, anyway), but to select the new members of its staff with an eye to their research productivity in possibly several lines, to stimulate and encourage them by giving them opportunity to work with graduate students, and to urge departments to cooperate in discussing and working over their research problems and projects.

LEONARD B. LOEB
KARL T. COMPTON
RAYMOND T. BIRGE

PHYSICAL LABORATORIES,
UNIVERSITY OF CALIFORNIA

BLOOD PRESSURE DEPRESSION BY LIGHT IRRADIATION

IN a recent publication, Smetana[1] reports the results of experiments in which he used technique similar to that employed in a series of papers[2] on the effects of light from various sources thrown on the blood flowing through a quartz tube inserted in the carotid artery in etherized dogs; he reports three experiments on dogs and one on a cat in which a carbon arc was the source of radiation, with the result that there was an average depression of 25 per cent. in the blood pressure of the dogs and 57 per cent. in the cat. From these he concludes (p. 599) "that exposure of circulating blood alone to strong light produces no strikingly greater fall of arterial pressure than might be expected to take place following approximately two hours' anesthesia carried out in the ordinary light of the laboratory."

In my original papers there were reported the results of about two hundred experiments on dogs, and many of these have since been repeated for various purposes since that time with comparable results. In one of these papers was reported an extensive series of control experiments in which by no means as great depression of blood pressure occurred as in the irradiated animals. Smetana does not report any controls nor does he give any information as to current, size or nature of carbons, or the distance of exposure, all of which are important factors influencing photobiologic effects. It may be assumed, though he does not so state, that no condensing lens was used. In most of my experiments a quartz condenser was used, thus greatly intensifying the energy incidence.

While not questioning the major conclusions of his paper, it seems that his conclusion that my results have not been confirmed is not valid for the following reasons:

(1) He reports no control experiments.

(2) His experiments are too few in number.

(3) It is common experience that the dog's blood pressure may be maintained practically constant under ether for periods of as long as five hours with carefully controlled technique.

[1] Smetana, Hans, *Jour. Exper. Med.*, 1928, xlvii, 593.

[2] Reed, C. I., and collaborators. *Amer. Journ. Physiol.*, 1923, lxv, 477; *ibid.*, 1925, lxxiv, 511, 518, 525; *ibid.*, 1926, lxxv, 351, 616; *ibid.*, 1926, lxxvi, 54. *Arch. Phys. Ther.*, 1927, viii, 108.

(4) The experimental conditions in the two series are not comparable if his description is complete.

(5) Blood pressure depression by light rays has been demonstrated by many investigators, both experimentally and clinically, by a great variety of methods.[3]

C. I. REED

BAYLOR MEDICAL SCHOOL,
DALLAS, TEXAS

A MORPHOLOGICAL EXPLANATION FOR THE FAILURE OF NECTURUS TO METAMORPHOSE

THE feeding of thyroid and other substances that effect amphibian metamorphosis has failed to cause this change in Necturus. Such feeding readily causes *Ambystoma tigrinum* to metamorphose.

Comparison of the aortic arches of *Ambystoma tigrinum* and Necturus reveals the fact that there are four arches in Ambystoma and only three in Necturus. This raises the question as to which arch has been reduced in Necturus. Investigators in general consider that the fifth arch is lost and that the most posterior arch is the sixth. This conclusion conforms to the usual behavior of the fifth arch in other vertebrates. However, there is evidence that the ventral portion of the sixth has been lost—three, four and five remaining. The evidence is based on these facts:

(1) That all aortic arches in Necturus supply external gills. True external gills are not found on arch six in any amphibian.

(2) The aortic arches follow visceral arches numbers three, four and five, the sixth visceral arch being reduced to a mere vestige.

(3) A vestige of the ventral portion of the sixth aortic arch has been found.

The spiral valve and most of the septa of the bulbus are also absent in Necturus. All these structures are of great importance at the time of metamorphosis of Ambystoma and the absence of these seems to be responsible for the failure of Necturus to react to metamorphosing substances. Without these structures there is no possible way by which Necturus could even partially separate pulmonary and systemic blood. Blood going to the lungs would thus be of exactly the same nature, so far as oxygen content is concerned, as that going to the body. Being thus unable to develop an efficient pulmonary respiratory system, it is not surprising then that Necturus retains its gills.

To test the above theory the ventral portion of the sixth arch was ligated in Ambystoma, producing a specimen with aortic arches similar to those in Necturus. This operation was performed on a number of specimens, which were placed in a tank with an equal number of controls. All were treated with metamorphosing substances. It was soon evident that the gills of the controls were being resorbed, while the gills in the Necturus-like specimens were still full length and in perfect condition.

FRANK J. FIGGE

COLORADO COLLEGE

HALIBUT FISHING

A RECENT report by the International Fisheries Commission reveals that, should the present rate of halibut fishing be continued for any length of time, the industry will be reduced to insignificance. Accordingly, a movement to save it is well under way, and stringent regulatory measures have been proposed.

It is pointed out that not only has there been a fall in the abundance of fish, especially on the older banks, which has fallen to 16 per cent. of the abundance in 1906, but there has been a decrease in the size of the fish, this being regarded as especially serious because of the very slow growth of halibut. As an adult fish is from twelve to twenty-five years old, the fish to be caught in the next ten years are already hatched and the yearly abundance for that period has been established. If these fish are greatly reduced in numbers and the present intensity of the fishery is maintained, according to the commission, the outlook for a stock of spawning fish sufficient to maintain the supply is rather hopeless. In fact, few mature fish are now found on the older banks.

Although there is a complete cessation of halibut fishing for three months each year, this measure is not adequate. The commission recommends as a minimum requirement that the halibut fishing be limited annually to some fixed proportion of the existing stock. In agreement with the best scientific opinion, it concludes that the taking of a fixed proportion of the halibut equal to that at present taken might ultimately stabilize the industry, since there are indications that the fish could survive under such conditions. Another measure proposed is the closing of two "nursery areas," one off Massett Graham Island, B. C., the other off Noyes Island in southwestern Alaska. In fact, the ultimate closing of all such areas is recommended. Furthermore, general restrictions are regarded as indispensable.

BIRGER R. HEADSTROM

MEDFORD HILLSIDE, MASS.

[3] Laurens, Henry, *Physiological Rev.*, 1928, viii, 1; Mayer, Edgar, "Clinical Application of Sunlight and Artificial Radiation," 1926, 130–31, Baltimore.