the expression of individual differences. Prof. John Givler states (*Turtox News*, January 1944, Vol. 22) that "mere orthodoxy is sterile and particularly odious in the laboratory which has to its credit historical laudation for smashing religiosity devoid of spiritual value." This is the kind of thing which through long repetition becomes "dry rot." The indications are that the spirit of a small, thriving college must be intimately tied up with research. Then, too, a research teacher usually leaves a lasting impression upon his students. We may say that this is at least partly due to the personal contact between teacher and student.

Many small colleges with very limited resources carry on a small but very serious research program without neglecting the students. In the case of a heavy teaching load, careful organization of the courses is most important; often the teacher sacrifices his own time and finances. It is noteworthy that Harry W. Greene (*W. Va. St. Coll. Bull.*, February 1946, Ser. 33, No. 1) has compiled two decades of research and creative writings at the college. This type of program, I am sure, is duplicated by hundreds of small colleges.

The undersigned (*Turtox News*, October 1945, Vol. 23) attempted to point out a few of the advantages derived from using living specimens in studying vertebrate embryology. The use of living embryos lifts the course from mere pedantry to one of intense interest and active participation. I quote from the above paper: "Aside from interest it is perhaps the best way to develop a student for future service to humanity, especially should he wish to set up his own experiments or do some form of research."

Finally, it should be emphasized that the "Little Researchers" all over America have a common bond of interest, especially where there are little or no funds set up for research. The undersigned agrees that the small colleges as a whole must not overlook the new Kilgore-Magnuson Bill and must at the same time impress upon Congress that the "Little Researcher" is still an important factor in producing the "Big Researcher."

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Redwood Notes

Of the nearly 50 species of conifers in California the redwood, *Sequoia sempervirens* (Lindl.) Engl., is the most important. Unlike its relation, the giant Sequoia of the Sierra Nevada, which is restricted to about 30 isolated groves, mostly of small size and between 5,000 and 8,000 feet elevation, the redwood occurs, often in great numbers, from Monterey County to the Oregon border, a distance of 450 miles (W. L. Jepson. *Silva of California.* Berkeley: 1910).

As a rule, redwood grows only in areas which are invaded by the ocean fogs. These areas include the regions of heaviest rainfall in the state, the annual precipitation of some stations exceeding 100 inches.

The coastal climate is very uniform with relatively little temperature fluctuation. Thus, at San Francisco there is a difference of only 10° F. in the mean temperature of the warmest and coldest months (60°–50°). As a result of these favorable climatic conditions the growth is almost continuous and the forest is very luxuriant. The rapidity of growth in the young trees may be extraordinary. For example, a young redwood, perhaps 5 feet high, was planted near my house on the Stanford campus in the winter of 1913–14. When 30 years old it was 105 feet high, with a breast-high girth of 10 feet. There has been a very appreciable increase both in height and girth during the past year.

The redwood belt, with an average width of about 20 miles, begins in the Santa Lucia Mountains in Monterey County, where there are a few redwoods in some of the canyons opening to the sea. For the most part the area is too dry to support the redwoods. At the northern limit a few redwoods are found in Oregon above the California boundary. The forest reaches its maximum development in the northern counties, especially Humboldt and Del Norte. In this region, through which the Redwood Highway passes, the traveler can observe many trees more than 300 feet high—one recently measured was 364 feet, probably the tallest tree of any species of which there is an authentic record.

While the heaviest forests are in the northern counties, there are large areas in the mountains south of San Francisco and especially in the Santa Cruz range, site of a State Redwood Park and the "big trees" near Santa Cruz. Redwoods are also still growing within a few miles of San Francisco, the best known of these groves being Muir Woods on Mt. Tamalpais.

The Stanford estate of about 8,000 acres is 32 miles south of San Francisco and extends westward to the base of the Santa Cruz range, where redwoods are abundant. Some of these are included in the Stanford property, especially along the San Francisquito Creek, which forms the northern boundary of the Stanford estate. A solitary redwood, an ancient landmark still standing and known as "Palo Alto" (tall tree), gave name to the Stanford farm where the University is situated, and the name was borrowed for the town of Palo Alto, which adjoins the University property and which was founded soon after the University was opened.

In the heaviest forests of the northern counties the redwood is the only species and may occupy extensive areas as pure stands. It is claimed that the amount of timber yielded from these extensive areas of pure redwood is the greatest known. Jepson states that yields of 120,000 to 150,000 feet per acre are not uncommon, and 480,000 feet have been cut from a single tree.

In the southern forests, e.g. in the Santa Cruz Mountains, the redwood is associated with a number of other species—Douglas fir (*Pseudotsuga*), tanbark oak (*Lithocarpus*), madroño (*Arbutus*), and, outside the redwood belt, a variety of trees which are also associated with the vegetation of the open valley.

A notable feature of the redwood is its remarkable power of regeneration. Unlike most conifers, it develops many sprouts from the cut stump, and some of these shoots soon become trees that replace the parent and restore the forest. Sometimes similar shoots develop from superficial roots. The very thick bark is resistant to fire, and after all the branches have been burned, the surface of the trunk may soon be covered with a mat of small twigs developed from dormant buds. In course of time, some of these twigs will replace the destroyed branches. Because of the favorable growing conditions in the redwood forest, which permit almost uninterrupted growth, the young forest is soon established.

The redwood probably never attains the enormous age of the Sierra big trees, some of which have been estimated to be 3,000 to 4,000 years old and greatly exceed in bulk the trunks of the largest redwoods. Jepson gives 400 to 1,300 years as the age of the mature redwoods, the maximum diameter of which is 16 feet compared with 30 feet in *S. gigantea.*

During the past years there have been active efforts to save what remains of the original forests—of special note are the activities of the "Save the Redwoods League"—which have resulted in the purchase of large areas of the finest redwoods, especially in northern California. As a result, these unique forests are probably secure for the future.

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Survival Time of Hypertensive Rats Receiving Fish-oil Extracts

The demonstration by A. Grollman (*J. Pharm. exp. Therap.*, 1945, 84, 128) that the blood pressure of animals with experimentally induced hypertension can be reduced by the oral administration of various extracts derived from oxidized oils raises the question as to the beneficence of this form of therapy. It is obviously important to know if the decline in blood pressure is accompanied by any deleterious effects such as are noted following the injection of many noxious agents which are also capable of reducing the blood pressure. We have therefore determined the effect of administering an oxidized crude fish oil on the survival of rats rendered hypertensive by the procedure of Grollman (*Proc. Soc. exp. Biol. Med.*, 1944, 57, 102).

The animals used for the experiment were a piebald strain reared in the laboratory and weighing 150 to 400 grams. A week following the operation on the right kidneys, the animals were divided into two groups, alternately, according to the level of their blood pressure. One group received the normal laboratory diet; the other, the same diet plus the addition of 10 grams of oxidized fish oil daily for the group. Two weeks following the first operation, the left kidneys in both groups were removed. Blood pressures were determined twice a week.

Observations were continued for two months following the nephrectomies. At the end of this period 21 of the control group of 44 animals had died, while only 11 of the 42 rats in the treated group had died. The average blood pressure of the control group was 134; that of the treated group, 129. The observed drop in blood pressure was, thus, apparently insignificant, due to the relatively small amount of activity present in the doses of oil used, as well as to the fact that the average blood pressure of the animals was not greatly elevated above normal.

A more convincing experiment was carried out on a group of 24 mice, the right kidneys of which were constricted and the left extirpated. Half of this group was treated with a more potent extract than was available in the case of the experiment on rats, which probably accounts for the better response observed. Of the 12 control animals, 10 had died at the end of a six-week period of observation, compared to only 2 in the group of 12 treated animals.

The experiments cited suggest that the administration of extracts of oxidized fish oil prolongs the life of animals with chronic hypertension.

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Logic and the Science Curricula

Mr. Churchman (*Phil. Sci.*, Vol. 12, 158) has pointed out that it is possible to enlarge our formal theories of logic so that they may meet with actual observations by including the between-group and within-group variance concept of the statistician in the formal theory. He might also have pointed out that the means of closing this gap between formal logic and the data of observation have been at hand since the concept of constancy of measured results through statistical control was introduced 20 years ago. The slowness with which this concept has penetrated the natural sciences, both biological and physical, is bewildering in this day of rapid progress. Perhaps it is to be expected in the physical sciences, where, due to the relative ease with which their experimental procedures can apparently be controlled, there is some smugness about the need of any statistical control. Mr. Kosolapoff (*Science*, 1946, **103**, 235) has done well to call attention to the fact that this control is not as effective as it appears.

The reason that many scientists reject the role of statistics as essential in the experimental method may be due to their failure to recognize the logical implications stemming from the fact that the value of all research lies in its significance for the future. This would indicate a serious deficiency in our science curricula, especially at the graduate level. Expectation that the student will acquire by spontaneous impregnation from his laboratory courses or from his elders a knowledge of the logic of the so-called scientific method is not realized; it is necessary that he take at least one course in logic and one in the philosophy of science. In the great majority of educational institutions this is not the case, even though the Ph.D. degree may be the reward for three years labor in science.

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