whole wide world which could be compared with this one in this respect. The cause for this unusual development of Naiad-life (as well as other freshwater life) of this region is found in the fact that here two old faunas, in themselves exceptionally rich, come together, the so-called "Cumberlandian," belonging to the upper Cumberland and upper Tennessee rivers, and that of the "Interior Basin" (Ohioan fauna).

I have tried to compile a list of Naiades known from the Mussel Shoals, and have found that about 80 different species and varieties are represented here, belonging to 29 genera, and this number is increased by some additional types known from the tributaries of the Tennessee River in this region.

This extraordinary fact has been recognized at a very early time. Exactly 90 years ago, Conrad[1] wrote:

> The bivalves are . . . peculiarly abundant in those rivers of North Alabama and Tennessee, which have cut their channels in the carboniferous limestone, and where generally a long grass affords them a secure hold against the rapid current of these mountain streams. The expansion of the Tennessee River, known by the name of Muscle Shoals, is of the character I have described; it is shallow, ornamented with a number of small islands, and its bed is full of the long grass which abounds in various species of Naiades. The lover of the grand and the beautiful in natural scenery, as well as the student in science, will here find abundant sources of interest. He will be delighted with a noble river, whose beautiful and numerous islands are clothed with gigantic trees; whose high and undulating shore on the one hand is ornamented with thriving villages, and on the other spreads out an extensive alluvial, rich in all the gifts of Ceres, or rises abruptly from the river a mural escarpment of carboniferous limestone, which reflects its blue and sombre aspect in the crystal waters at its base. Like many other spots, however, remarkable for their loveliness, the subtle messengers of death have chosen it for their abode, infusing the poison of their breath into the serenity of autumn, when the transparency of the air and the purity of the sky, together with the gorgeous scenery, present at first to the unconscious traveller sensations alone of health and enjoyment.

At the present time, the above description holds good only in a small part. The beautiful islands, and the general features of the river itself are gone, as well as a large portion of the fauna, chiefly that of the mussels, which depend on the ecological conditions once presented here. For a dam has been built, the "Wilson Dam," just at the lower end of the "Little Mussel Shoals," about two miles above the town of Florence, ponding the river for many miles, and drowning entirely the "Little" as well as the "Big Mussel Shoals," beginning about four or five miles farther above. With the destruction of the conditions favorable for Naiad-life also the Naiades have been destroyed, which is so much more to be regretted, as there were forms among them which have been found only at this locality, and very likely will be, sooner or later, entirely extinct.

There are some shells yet present in this region, chiefly below the dam; but this is only a small remnant of the original richness of the fauna, and there is great danger that also this remnant will gradually disappear, due to the pollution of the waters which will be a consequence of further "improvements" connected with the dam. And then the "glory of the mussel shoals" will be entirely gone, those characteristic and unique features which would rather have deserved to be kept intact and preserved as a "natural monument," second only to very few other monuments of the United States.

Only one part of Conrad's description has been intensified and emphasized by the present conditions: this is the part which speaks of the "subtle messengers of death," undoubtedly alluding to malaria (and mosquitoes), although Conrad, of course, did not know anything about their connection. But the fact is that mosquitoes and malaria are increasing to such a degree that the inhabitants of Florence and other towns in the vicinity are becoming alarmed, and are beginning to discuss preventive measures.

Truly, a sad state of affairs!

A. E. ORTMANN

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[1] Conrad, T. A., "New Freshwater Shells of the United States." Philadelphia, 1834, pp. 12, 13.

AS STUDENTS UNDERSTAND IT

THE assumption of omniscience in Dr. David Starr Jordan's comments on my list of student misconceptions, published in SCIENCE of August 29, reminds me of the old story of the man who consulted a physician for relief from an irritation in his chest. "What is your profession?" asked the doctor. "I play in a brass band," answered the man. "Just the trouble!" exclaimed Medico. "I have always claimed that this excessive blowing of horns was injurious to some lungs; What instrument do you play?" "I beat the bass drum," answered the man.

No one would question the absolute necessity of laboratory contact work in any science course, and the lecture accompaniment should be and doubtless is of a summary and explanatory nature.

In all the science courses at the Virginia Polytechnic Institute, in biological matters there are laboratory courses in invertebrate and vertebrate zoology, six hours a week for one term in each, using Dr. Pratt's two manuals as laboratory guides; in botany, systematic laboratory, 6 hours a week for one term, and in advanced botany, 6 hours per week for one

term. There are also laboratory courses in entomology. The department of bacteriology requires 15 hours per week laboratory work for one term.

It is true that the agricultural students do not get the zoological laboratory, unfortunately, and here Dr. Jordan's strictures will apply; though these men get the botanical, entomological and bacteriological laboratory work.

It may be pertinent, however, to say that the student who gave the answer as to the reptile legs, which answer Dr. Jordan specifically comments upon, had had both the invertebrate and the vertebrate laboratory work and had only recently dissected, among vertebrates, shark, perch, frog, snake, turtle, sparrow and rat.

ELLISON A. SMYTH, JR.
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I HAVE read the article by E. A. Smyth, Jr., in the October 10, 1924, issue of SCIENCE. This discussion is continued by David Starr Jordan, of Stanford University, who raises the question whether after all such ludicrous answers are not explained because of the use of the "lecture" system. He maintains that it is a lack of "contact" or the actual working with plants and animals which brings about a lack of appreciation, or actual knowledge in the minds of our students. In other words, he says, "the results of contact may be permanent."

I did not observe that E. A. Smyth, Jr., obtained the answers quoted as a result of the lecture system —he does not so state in his article. I agree in principle with Dr. Jordan, but in actual practice it does not necessarily work out this way. I am not at all convinced that his method of approach will overcome the lack of thinking and reasoning on the part of our freshmen or even upper classmen. I have been engaged in teaching only about one third as long as E. A. Smyth, Jr., but I have realized that many inane answers may be obtained from "contact" studies in the laboratory as well as from other methods.

"You can lead a horse to water, but you can not make him drink"; also, you can show students the way to knowledge, but you may not be able to make all of them think or reason logically. Working with the hands and using the eyes do not necessarily fix things in the minds of our students.

I am teaching a freshman class in botany this year. I would rather teach freshmen than a group of upper classmen, because they are more ready to be shown and less sophisticated. The intentions of our students undoubtedly are good. Why, then, do we get such answers? It can not be explained by any one cause. To illustrate: we have one experiment in our freshman course in botany which has been recently performed—to determine the need of water for germination of seeds. The experiment was definitely outlined and ample instructions were given. The students were supplied with honey locust seed, blotting paper and files for cutting notches in the seed coats. The students were told to perform the experiment and set the seed aside until the next laboratory class period, when they were to make an examination to see what had happened. After the results were observed, they were told that the experiment illustrated a principle involved in scarifying alfalfa and sweet clover seed to increase the percentage of germination.

In a quiz a few days later, the students were asked to describe an experiment which demonstrates the need of moisture for seed germination. Since the quiz was given a week after the experiment was performed, I am perhaps unreasonable in expecting them to retain the knowledge that long. This was one of the answers:

> The experiment in which the need of moisture for germination was the one where we took the same kind of seeds and placed them in different conditions. One batch of seeds was moistened, *placed in an oven at a hundred degrees centigrade,* while the others were left in the room at regular temperature. The ones in the oven where there was no moisture for germination were not as good as the seeds that were where moisture could get at them.

The young man submitting this answer had a hazy recollection of another experiment which he performed by "contact" and which aims to show the difference between the moisture content of air-dried seed and germinating seed.

Many of these absurd answers, but not all, could probably be explained by the fact that no matter how a course is taught, it seems to be human nature for the youngsters to have their minds on "dates," dances, parties, pep meetings and the Saturday football game while they are engaged in their work. With these things uppermost in their minds, how can we expect thinking and reasoning on the various subjects required in our curricula?

The students of Agassiz lived at a different age, distractions were perhaps not so numerous, students were probably more mature and serious minded and burning with enthusiasm to obtain knowledge. Our youngsters are "burning with enthusiasm" also, but the fire is kindled elsewhere. If Agassiz were teaching in 1924, with his classes largely composed of 16 to 17-year-old students, and if his laboratory had 25 to 30 students instead of five or six, with the present-day environment in place of that which obtained in 1874, it is scarcely a debatable question in my mind as to the nature of some of the answers he would receive.

It is perhaps unfortunate that most of our courses in science must necessarily call for facts instead of entertaining information, but I am not as yet convinced that the doing away with lecture work and emphasizing contact work will greatly improve the situation where our classes are large and the subject-matter required.

I do not, however, want to be understood as being an adherent of the lecture system. The easiest way for any of us to explain the situation seems to be to blame the other fellow—something must be wrong with our secondary schools and the age at which the boys and girls enter college. On the other hand, I believe our students have a right to question in some instances the teaching ability of the instructor. As college teachers, our greatest responsibility is not to teach our undergraduate students primarily facts, but to think. The question in each one's mind should be how this can best be accomplished under the present conditions.

L. E. MELCHERS
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RECENTLY SCIENCE published so-called "howlers" composed by students during examinations. While the compositions are humorous in a certain sense, yet they possess a pitiable aspect in revealing the lack of preparation in English and geography and a lack of coordination of thought, especially on the part of students entering college. The following have been selected from the writings of students in several schools and in upper classes as well as first year. The quotations are verbatim.

The preCambrian roch were where in distinct fossil were found. The rocks were mostly ingneous and meta morphosed, with some sedimentation in the proterozoic Limestone was found in the rochs. which lead to evidence of life of some organism The Archean is universal and very thick. This tell it was a long period of time and equal. The proterozoic rocks have eroded some.—

Ripple marks and cross bedding are due to formation within minerals of minor minerals on thin planes.

Continental deposits are deposits formed by wind, such as the Rocky Mountains, these deposits are called stratification.

—magmas extrusively imbedded in the earth's crust.

A loess is made up of a yellowish-brown material which was peculiar to geologists.

A fossil is the historic record of the past geologic conditions of the world and the chief proof of the fact of evolution or the gradual descent of man caused by the decomposition of animals or plants in rocks under conditions favorable for preservation.

Even Bolivia may be found in young and old river valleys.

The ginkgo would have perished after the Mesozoic had it not been cultivated by the Chinese.

Trilobite is a good name because they have feelers.

Gradation is the desire of the earth to level itself.

Stages in development of streams may be compared to stages in children. In infancy they are gullies; in youth they have straight sides and narrow bottoms.

The Rockies were formed between the Cretaceous and the Plastaceous.

Relief features of the second order within the ocean basins are not much concerned with human nature.

If the La Placian hypothesis were true all planets would revolve around the sun once a year.

The agriculture is mostly mining.

WALDO S. GLOCK
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THE examples of student misinformation submitted by Professor Smyth will doubtless start an avalanche of *Outrageous Biology* from teachers who hitherto have scarcely dared admit what is possible from their students. From my own collection of some years, one which I alternately view with delight and despair, may I submit these gems?

The liver is a capillaraceous organ whose function is to produce a fluid used in digestion and reproduction. Its outlet is the arteries.

Breathing is rhythmic because it takes so long to take in a breath and so long to let it out and we have to rest between. This is controlled by valves, which are in turn regulated by a column of mercury 760 mm in height. Thus we see that when the system is in proper working condition breathing is rhythmic.

CLEMENTINA SPENCER MOMYER

THE RACIAL ORIGIN OF ALMSHOUSE PAUPERS IN THE UNITED STATES

IN an article under the above title which appeared in SCIENCE for October 31, Dr. Raymond Pearl says:

While on January 1, 1923, there were in almshouses 59.8 native-born white persons per 100,000 of the same class in the population, the corresponding figure for the foreign-born was 173.6. This is by some regarded as a fact of dread significance. Perhaps it is. To me it seems possibly only an interesting expression of the difficulties which the human organism finds in adapting itself to a new environment.

As an additional factor not to be overlooked I suggest that the native has relatives and old friends who would feel it a disgrace if he had to enter an almshouse and who prefer to help him along and even support him rather than endure it, while the foreign-