in a wild state. There would be many distressing appeals from botanists if redwoods, beech and giant cedars and other trees with their associated shrubs and herbs were rapidly coming under cultivation as nursery stock.

This need has been realized by animal ecologists and students of wild life for some time. It was brought to more general attention at about the same time by the National Park Service and a committee of the Ecological Society. This resulted in the investigation of thirteen areas, four or five of which were considered suitable for a Great Plains National Monument.

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ZOOLOGY FOR PRE-MEDICAL STUDENTS

UNDER the above title, Dr. H. S. Diehl[1] advised less zoology and criticized the alleged arts college advice to pre-medics "to take as much zoology as they can possibly get in."

Zoologists in charge of pre-medics are really not advising "all they can possibly get in," but urging all such zoology courses (as well as those chemistry courses) which will give the pre-medics a sufficiently thorough preparation to do well in the medical aptitude tests, and get in and stay in medical school. To "take only those courses which are required for entrance to medical school," as we are told some medical deans advise, is ambiguous. It probably means the well-known minimum, as given in all medical catalogues, including one year of zoology or biology, one of physics and three semesters of chemistry. It is ambiguous, because experience shows such zoology (and chemistry) inadequate, and considerably more zoology advantageous, as we are assured in reading the aptitude tests and in heeding all that is related by our graduate pre-medics who visit after a year or two in medical school.

Moreover, and most important here, medical school catalogues when studied more, as I studied over 40 of them, show many cases of various other required zoology courses and other courses that are recommended. I summarized in detail these courses for half a dozen medical schools, nearer our institution or to which most of our pre-medics have gone. This summary was found to be too extensive to appear in these columns, however. To prepare our students advantageously in this larger scope and different pattern of zoology requirements, we have in our four-year pre-medic curriculum three times as much zoology as the one-year minimum, plus a course in bacteriology. Only the latter would not be necessary according to the various requirements and recommendations.

Dr. Diehl criticized taking arts college courses of the same type as medical school courses, to which we agree, as most likely such courses in arts college would be dilute and poor. A course in human physiology should be displaced by a foundational laboratory course in general physiology. Following advice of medical school men, we give that type of course. Genetics is an essential course. Human embryology (which our critic cites) is not to my knowledge given in arts colleges, but a basic laboratory course in general vertebrate embryology, on frog and chick mostly, is and should be given. Finally, comparative vertebrate anatomy is an entirely different course in the arts college from human anatomy in the medical school. The comparative may not cause students to make an appreciably higher grade in mastery of details of regional gross anatomy when working on the cadaver, but it will give the beginning medical students a far broader and wiser outlook upon human anatomy.

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[1] SCIENCE, 89: 604, June 30, 1939.

SCIENTIFIC INVENTION AND SOCIAL CONSCIOUSNESS

SOME months ago, in the pages of this journal,[1] before aerial frightfulness broke out in Europe, I drew attention to the remarks made in 1670 by the inventor of the first airship, Francesco Lana. Lana conceived the greatest objection to his invention to be the inhuman and unconscionable uses to which it might be put by unscrupulous men.[2] Now that submarine frightfulness has for some time been under way in Europe, it may not be without some interest to hear what the inventor of the first submarine, who wrote 170 years before Lana, thought of his work. He writes (about the year 1500):

> How by an appliance many are able to remain for some time under water. How and why I do not describe my method of remaining under water for as long a time as I can remain without food; and this I do not publish or divulge on account of the evil nature of men who would practice assassination at the bottom of the seas, by breaking the ships in their lowest parts and sinking them together with the crews who are in them; and although I will furnish particulars of others they are such as are not dangerous, for above the surface of the water emerges the mouth of the tube by which they draw in breath, supported upon wine-skins or pieces of cork.

The writer of these words was Leonardo da Vinci.[3]

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[1] SCIENCE, 90: 180, 1939.
[2] F. Lana, Prodromo, Brescia, 1670.
[3] Leicester Mss., 22 v. See Edward MacCurdy, "The Notebooks of Leonardo da Vinci," 850–51, New York, 1939.