prepared. A limited number of copies are available for general distribution, and may be obtained without charge from the Secretary of the American Association of Anatomists, Professor George W. Corner, The University of Rochester School of Medicine and Dentistry, Rochester, N. Y.

DISCUSSION

COAL AND NATURAL OIL IN THE PITTSBURGH REGION

ATTENTION should perhaps be called to a statement in an article by Dr. Berl, entitled "The Origin of Natural Oil,"[1] in which the author says: "The presence of bituminous coal and oil in the same localities, but in different strata, for instance near Pittsburgh, forces one to the point of view that both substances were formed from the same material."

The horizons in which coal and oil, respectively, are found in the Pittsburgh region are so far removed from each other geologically that their geographical agreement must be viewed as irrelevant in any discussion of their origin.

The various coal seams lie in the Lower and Upper Coal Measures (Pennsylvanian), and the Upper Barren Series (Permian), whereas the oil-bearing sands are in the Subcarboniferous (Mississippian), and the Upper Devonian. The conditions under which the material of the coal beds accumulated, the origin of which is obvious, were very different from those which prevailed throughout the Upper Devonian and Mississippian, in the Pittsburgh region. There is total absence of evidence of swamps, such as contributed material for the coal seams, in the deeper-lying strata where natural oil is stored.

Whatever may have been the origin of natural oil, the fact that oil and coal happen to occur in the latitude and longitude of the Pittsburgh region has no bearing on the question.

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DISTRIBUTION OF PAPERS IN BIOLOGICAL SCIENCES FOR THE PAST EIGHT YEARS

THE summaries of researches in biology that appear in *Biological Abstracts* make it possible to determine fairly well the degree of research activity in various divisions of biology. While the editors of *Biological Abstracts* warn that it is not yet possible to cover all biological research papers published the world over and that a group of journals known to contain biological research can not yet, for one reason or another, be covered, this probably does not substantially affect the numerical relations between the various subjects discussed below.

My class in theoretic biology was assigned the job of determining the number of papers reviewed in *Biological Abstracts* during the entire period of its publication since 1927, *i.e.*, about eight years. The total number enumerated by us was 169,744. Of all the categories of papers classified in the table of contents we chose twenty-two groups. We did omit a few sorts of papers. We listed in one group all papers concerning animal physiology which is made up of twenty sub-groups. We similarly combined sub-groups of papers having to do with economic entomology and treated others likewise. We combined plant and animal paleontology into one group. This last named grouping might be criticized because the reviews in paleozoology in the *Abstracts* are general papers only, since systematic and morphological papers appear elsewhere.

We determined the number of papers in each of the twenty-two groups; found the total for each year, and then the percentage of each group of the total for that year. We then charted the variation in numbers of papers in each group for the entire eight years, but the results of this charting are not presented at this time. We also averaged the percentages of each group for the entire eight years. The results of this computation are graphically represented in Fig. 1, which also includes the percentage averages just referred to.

It should be remembered that, due to at present unavoidable difficulties, abstracts of papers are published a number of months after original publication. Systematic zoology holds first place in numbers of papers abstracted and indicates greatest activity, the total being about 38,000. Thus one of the oldest and most fundamental of biological sciences is still very much alive. Next in degree of activity is animal physiology. Nearly half of all papers reviewed are more or less directly related to the well-being of man. These groups are animal physiology, animal pathology, bacteriology, economic entomology, immunology and pharmacology. May this be interpreted as indicative of the practical tendency of pure science?

We did not attempt to weight the scientific value or importance of the papers, since we did not consider ourselves wise enough to do so. After all, would it be possible to appoint a board of judges who would give a worth-while verdict as to the relative value of this or that investigation? Would an endocrinologist regard work in systematic botany as important as his own? Some might view investigations in physiology that would reduce the mortality of babies as of great value. Others, thinking of difficulties that await the same babies when grown to adult life, might

[1] SCIENCE, 81: 2088, 18, January 4, 1935.

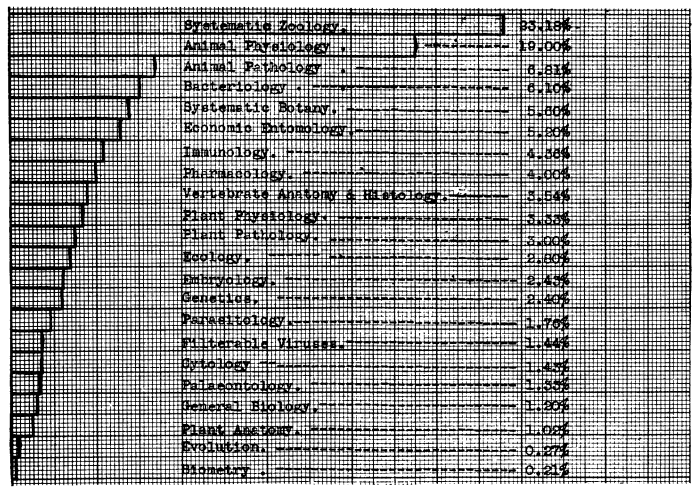

FIG. 1. Distribution of papers reviewed in *Biological Abstracts* from Vol. 1, 1927, through Oct., 1934, Vol. VIII.

regard the same investigations in an entirely different light.

And what about evolution? Papers dealing exclusively with evolution are surprisingly few. This situation may possibly cheer up the fundamentalists—or are there fundamentalists to-day? It *is* true that certain papers in experimental genetics and taxonomy discuss aspects of evolution which is not their main purpose. Is it not a fair conclusion to state that although biologists do not at all regard the evolution problem as solved, yet they evidently are not much interested in it? Is it because working in physiological fields "pans out" better?

Biometry appears to be in a state of real *depression!* According to our determinations, biometry occupies last place. At about the beginning of the present century there was great enthusiasm for biometry as a tool for measuring evolution. *Biological Abstracts* covers five or six journals devoted wholly to biometry of statistical methods but does not attempt to include many others, as for example those in which actuarial material is dominant. Nor do we find reviews of statistical papers which purport to demonstrate expectations of rise in stock values!

It must be exceedingly difficult to classify in existing categories some types of papers. Whether we wish to call it evolution or not, there is constant change in *styles* of investigations. For example, there is a place for papers in embryology and a place for papers in physiology. But at present there is considerable activity in the physiology of developmental phases. Difficulty in assigning papers such as these will continue because the biological sciences constitute a growing and changing body of knowledge.

Finally, it might not be amiss to acknowledge the debt biologists owe to *Biological Abstracts,* a truly democratic enterprise of the Union of Biological Societies. Its value will tend to increase in geometrical ratio as the years of its publication accumulate.

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LABUAN, BORNEO, A NEW LOCALITY FOR THE WHALE SHARK

ON March 29, 1934, while working at the office of Dr. W. Birtwistle, director of fisheries for the Straits Settlements and Federated Malay States, at Singapore, the captain of a coasting vessel came in for information. He had with him the picture and dimensions of a very large fish which he had seen at Labuan a few days before. No one there knew the fish, but I recognized it at once as a fine typical example of *Rhineodon typus,* the whale shark. The specimen was 25 feet long.

Labuan is a small island on the northwest coast of Borneo, and gives us a new locality in plotting the distribution of this great fish. I had previously recorded the occurrence of the whale shark at Darvel Bay, on the northeast coast of British North Borneo, and had predicted its occurrence along the coast of the whole northern half of Borneo. The Sulu Sea is evidently one of the favorite haunts of this enormous fish, for we now have many records of its occurrence in all parts of the Philippines contiguous to the Sulu Sea. These records go back over a hundred years. Since the shores of North Borneo are laved by the Sulu Sea we may look for the whale shark anywhere in that region.

I have no doubt that Rhineodon is equally common in the Celebes Sea, which is connected by broad deep passages with the Sulu Sea. It may therefore be expected all along the north coast of Celebes and eastward along the north shore of New Guinea. Young whale sharks, up to a length of ten meters,