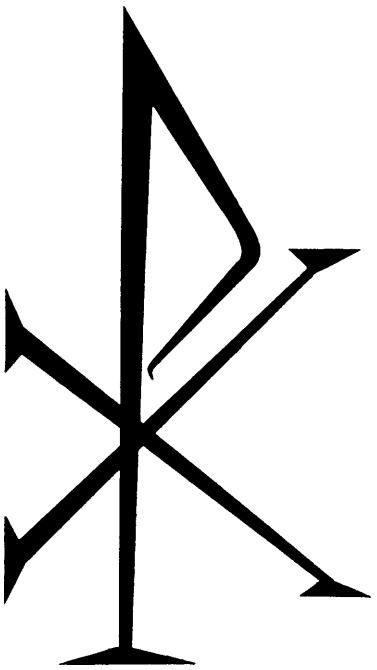
CREATION RESEARCH SOCIETY

QUARTERLY



Haec credimus:

For in six days the Lord made heaven and earth, the sea, and all that in them is and rested on the seventh. – Exodus 20:11

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CREATION RESEARCH SOCIETY QUARTERLY

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OUR NEW EDITORIAL LINE-UP AND A PLEA FOR MORE ARTICLES AND REVIEWS OF THE LITERATURE

Beginning with this October Quarterly we have a new editorial line-up with Dr. John N. Moore of Michigan State University as Managing Editor. The printing from now on will be done in Michigan to save time in getting the various editions to our Treasurer Wilbert Rusch, Sr., who will continue to mail them from Ann Arbor. We are indebted to the Color Art Press of Oakland, California, for the fine work they have done in publishing the past issues.

We are also fortunate in that Drs. John C. Whitcomb and George Howe will work closely with Dr. Moore in the proof reading tasks so important in getting a publication relatively free of typographical errors.

The time has come again to ask for your cooperation in securing worthwhile articles for our 1966 Annual. We particularly wish to dedicate this to evidence for catastrophic action as an explanation of geological phenomena. Not only are we interested in showing the evidence for a universal flood as an explanation of many of the geological formations, but also in evidence for later widespread catastrophes. Several fine papers have been promised already but we need more.

Also papers showing the clear evidence for design in nature are always welcome. Many articles are constantly being published which need reviewing in order to show how impossible it is to account for the remarkable facts disclosed, on the basis of natural selection of mutations. Thus in the September, 1965, National Geographic Magazine, an article entitled, "Asian Insects in Disguise" (p. 433), is most fascinating. Another example is the May, 1964, article, "Malaysia's Giant Flowers and Insect Trapping Plants" (p. 681), in the same publication which deserves careful review. Both articles show such clear evidence for careful design as to constitute a real challenge to any theory of evolution, and particularly one based on the natural selection of mutations.

Articles such as these should be read and reviewed by our members. The more who write, the greater will be the impact of our testimony, for, though the voice of one may not be heeded, the expressed convictions of many can scarcely be long ignored.

Deadline for articles for the 1966 Annual is January 15, 1966, and the manuscripts may be sent to any one of the associate editors or to me.

Walter E. Lammerts,
Editor

DR. BARNES' TEXT BOOK COMMITTEE MAKING PROGRESS

A textbook committee has been selected from the Creation Research Society to write a high school biology textbook. It has the endorsement of the Steering Committee and hopes to fulfill one of the aims of the Society. Dr. Thomas Barnes is sure that members are aware of the great need for a strong biology textbook at this level which is consistent with the statement of belief of the Creation Research Society.

Dr. Walter E. Lammerts, Dr. Douglas Dean, Rita Rhodes Ward and Dr. Barnes have done some preliminary planning and have made studies of current high school textbooks. Dr. George F. Howe and Dr. Bolton Davidheiser have also made pertinent suggestions.

The material will be portioned out to the committee members according to their specialties and desired areas of work. Each member will have the opportunity to participate in the determination of the scope, level, and content of the book as well as the committee policies.

Most of the work will be coordinated by mail. Dr. Barnes has Xerox facilities and will reproduce each member's contributions for circulation to the other members.

Suggestions by both active and sustaining members, many of whom are teachers, will be welcomed by the members of the committee.

The following committee has been appointed by Dr. Thomas G. Barnes.

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A CRITIQUE OF THE BSCS BIOLOGY BOOKS

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Introduction

In January 1959 The American Institute of Biological Sciences set up a committee called the Biological Sciences Curriculum Study. Supported by the National Science Foundation, the committee, commonly called the BSCS, undertook a study of biological teaching from kindergarten to college. It was decided to provide an entirely new type of curriculum starting with the key level, high school.

When study was started under the direction of a steering committee, it soon became evident that ideas of suitable approaches varied so widely it would be impossible to prepare a single text that would please all, Accordingly it was decided to prepare three texts with different methods of approach. To prevent ranking the texts it was decided to call the texts by colors, so they came to be called the *Green Version,* the *Yellow Version,* and the *Blue Version.* The Yellow *Version,* given the title *Biological Science: An Inquiry Into Life,* was published by Harcourt, Brace and World, Inc. Rand McNally and Company published the *Green Version* which was given the title, *High School Biology.* The *Blue Version*, *Biological Science: Molecules to Man,* was published by Houghton Mifflin and Company.

The Themes of the Books

All the texts and the accompanying laboratory work are built around nine themes which are proposed as unifying themes. They are as follows

"**1.** Change of living things through time: evolution
2. Diversity of type and unity of pattern in living things
3. The genetic continuity of life
4. The complementarily of organism and environment
5. The biological roots of behavior
6. The complementarily of structure and function
7. Regulation and homeostasis: preservation of life in the face of change
8. Science as an enquiry
9. The history of biological conceptions"[1]

According to Schwab the first five of these themes are concerned with content, the sixth and seventh are intermediate, and the last two are concerned with the structure of the BSCS materials. Let us note what this author has to say about evolution in the first five themes or the content of the courses:

Theme 1: "It is no longer possible to give a complete or even a coherent account of all living things without the story of evolution." [2]

Theme 2: "As we have indicated before this theme is, in part, a special aspect of the theme of evolution." [3]

Theme 3: "This theme, too, is part of the theme of evolution" [4]

Theme 4: "This theme, too, is part of the theme of evolution especially where it concerns the environment of the whole organism."[5]

Theme **5:** "In brief, the BSCS texts emphasize behavior as arising not only from the experience of the individual but also from the 'experience' of its forebears, the stored experience arising from variation and selection in evolution."[6]

The slant of the content of the texts is unmistakable. Theme 6 is equally evolutionary in its approach. Again we quote:

"Long before the mechanism of evolution was understood, the well-organized character of life units was recognized and the functions of their parts investigated. With the development of the theory of evolution, the conception of function underwent important changes. We no longer thought of the organism as a *perfect* organization but instead recognized the possibility of the vestigial, the novel, and the incompletely relevant part. This did not mean, however, that the conception of function became obsolete. On the contrary, within the limits required by our knowledge of evolutionary processes, we still sought evidence through which to understand each part in terms of its contribution to the whole." [7]

The theory of evolution is not explicitly mentioned in the discussion of the seventh theme. The last two themes are concerned with the ways in which the content of the courses is presented to the student. Theme 8 suggests that science is an enquiry. The authors oppose the use of authoritative statements:

"We have remarked that teaching science merely as authoritative facts and dogma has had an extremely bad effect on American attitudes toward science and scientists." [8]

The authors state that authoritative science teaches the student to distrust science since he learns later that some of the "facts" he was taught in high school were errors. Accordingly BSCS proposes to teach the student that science is an enquiry that never is finished. To emphasize the uncertainties the texts freely use many such expressions as these: "we now believe" or "according to the best information now available." This is good as far as it goes, but note how the writers practice the authoritative slant which they condemn. Although the authors decry the use of authoritative statements, we find the texts have authoritative statements intermingled with clearly qualified statements. The following quotations from the *Yellow Version,* chosen at random illustrate this:

Properly qualified statement: "Certainly we have no direct or indirect fossil evidence that the earliest living things were associations of organic molecules living in a hot thin soup."

Qualified but suggestive statement: "Although the evidence is still inconclusive, it suggests that for more than a billion years, the dominant and perhaps only forms of life on earth were microscopic organisms such as algae, bacteria, and molds."

Authoritative statement: "Yet any certain knowledge of these ancient events is scanty. This is because fossils of early organisms are exceedingly rare. *The cause of this is twofold. First, most of the early animals and plants were small and had soft bodies. They decayed and left no traces. Second, the sedimentary rocks that formed during these early times have generally been altered so much by heat and pressure that fossils in them would have been destroyed."* (Italics added)

Authoritative: *"These rocks contain the fossils that tell the story of evolution." (* Italics added)

Authoritative: *"Tremendous events had occurred before the Cambrian period, however. This we know because already in the Cambrian we find a rich variety of complex animals and plants."* [9] (Italics added)

Reading further we find this mixed quotation: "This apparent explosion of life at the beginning of the Cambrian is in a sense discouraging. It means we find it difficult to learn much about *the evolution that took place before the beginning of the Cambrian."* [10] *(* Italics added)

In reality the BSCS books contain many authoritative statements, but there are enough qualifying statements to give the impression of objective integrity. Thus the student may easily be taken in by the infusion of unfounded authoritative statements.

The Presentation of Evolution as a Theory to the Student

Concerning the importance of evolution as a theory Schwab has this to say:

"It is no longer possible to give a complete or even a coherent account of living things without the story of evolution." [11]

Furthermore Schwab explains to the teachers how evolution is presented to the student:

"Because of its pervasive and comprehensive character, evolution is treated in three different ways in the BSCS materials. There are specific chapters on *evolution as the history of living things.* There are specific chapters on *evolution as a process.* And third, evolution *either* as a history *or* as a process is *interwoven* in all the other chapters where it has a place: in the treatment of cell chemistry, ecology, taxonomy, and so on." [12] (Italics added)

Even though evolution permeates the entire course, the authors carefully refrain from explicitly labeling evolution as a "fact" in the texts but tell the students it is a "theory." Let us see how this is done.

Green Version: "Both the revolution in astronomical thinking and the revolution in biological thinking were difficult. But both were complete. No one who has read attentively thus far in this book can fail to gain the idea that living things–individuals, populations, species, communities—are constantly changing. From the first chapters the idea of biological change through time has been constantly before us-where not directly mentioned it has been implied." [13]

"Overnight nearly all (but not quite all) the biologists of the world were convinced that this theory–the *theory of organic evolution–is* true." [14]

Yellow Version: "Of all the theories you may study in biology, evolution occupies a unique place. It is the most inclusive of the great unifying principles of biology. It is so much a part of the foundation of biology that the science can hardly be understood without it. . . . . .

"Evolution is a scientific theory. It [the theory] has been developed to account for an existing body of data." [15]

In the *Biology Teachers' Handbook* is found a very interesting comment regarding application of the term *theory* to evolution. I quote:

"A special word is necessary concerning our habit of referring to 'the *theory* of evolution.' This usage is often taken to mean that evolution is but an envisaged possibility, something uncertain and unproved. This interpretation, in turn, is due to a mistaken idea about the meaning of 'theory' and its place in science. This mistaken idea treats science as a process of verification.

In that process of verification, it is mistakenly supposed that materials go through three stages or degrees of certainty: a first stage, of complete doubt, called hypothesis; a second stage, of uncertainty, called a theory; a third stage, or certainty, called a fact or principle. This sense of 'theory' no longer holds in science, if it ever did. Modern science is not merely a process of verification of isolated items but a process of organization as well. In this twofold process, 'theory' refers, not to the uncertain, the unverified, but rather to the coherent and organized . . . Evolution is a theory in this sense, yes–a body of *interrelated* facts. As new facts about evolution are discovered, the organization may be changed in order to include them, but this would *not* mean that the present organization of facts now known is unsound." [16]

It would seem that the laws of some states prohibiting the teaching of evolution as a fact but permitting its being presented as a theory are rather pointless when that interpretation of "theory" is used.

Confusion of Terms

Not only is the use of the term "theory" confused in general, but there is failure to delineate between *limited change,* which is easily observed or demonstrated in the laboratory, and *total evolution* which is nothing but hypothesis. Schwab states the two phases this way:

"Evolution, then, forms the warp and woof of modern biology in two different ways. First, evolution appears as the *history* of organisms, the sequence of unique events in past time from which the biological present has had its origin. . . . This history may well be the key to understanding the biological future . . . Second, evolution appears in organisms as a *present* phenomenon. We have not only inferred the course of evolution in the past from such evidences as *all* historians use, but we have also seen it occur in the living present." [17] (Italics added)

On examining the texts it can be seen that the writers use "present evolution" (limited change) as evidence to support "historical evolution" (molecules to man). The Green Version, for example uses Darwin's finches, various breeds of chickens, the peppered moth, the two color phases of screech owls and of foxes, various kinds of Cucurbita, and the colors of hares and rabbits as examples of limited change or "present evolution" to illustrate the presumed basis of "historical evolution" (molecules to man). There is no suggestion that the gaps between orders, classes, and phyla are not crossed either in the fossil record or in nature today.[18, 19, 20, 21]

But that is the very place an objective text should point out those qualifying limitations. Although some weaknesses in the theory are mentioned, many other weaknesses are not pointed out. Perhaps the following quotation gives the reason:

"Every law has its exceptions or its uncertainties, and every theory is subject to question. Sometimes these exceptions and uncertainties must be *minimized,* else the student might become *disconcerted, confused* and *hindered* in achieving an understanding of what we know as science. Later these limitations should be examined as the student's understanding progresses," (Italics added)

The Use of Genetics to Support Evolution

The BSCS texts place great emphasis on genetics as providing the explanation of how evolution supposedly takes place. Mutation is considered the source of change with selection providing direction, Again the authors fail to point out some pertinent facts. Note what Dr. Walter E. Lammerts (professional geneticist) has to say about these omissions in the Yellow Version:

"I am amazed that they use the Hardy-Weinberg principle as part of their proof of evolution. This expression of *stability* of a breeding population is used very cleverly to prepare the student for the idea of change. Then change is equated with evolution and the mind is all prepared to accept almost any proposition no matter how impossible such as the conversion of fins into legs. What amazes me is that they fail to say that since most mutations are harmful under natural conditions, the Hardy-Weinberg stability principle is accentuated by selection *against* the accumulation of mutations! But since this selection can only operate against the homozygous mutant, the feed back into the next generation by the heterozygote continues. Since obviously mutations are in the great minority to start with they are soon eliminated! They fail to state that no population studies have yet demonstrated a take over by the mutant gene." (Personal communication)

Materialistic Philosophy

One does not find any statement that there is no God in the BSCS books, but the material is so handled that the student easily concludes that God is not necessary. At that point atheism is the next step.

In the Yellow Version, chapter 4 (29 pp.) is devoted to a study of vitalism versus mechanism as a means of explaining life phenomena. The two terms are defined as follows:

"There have been two main philosophies to account for the relation of life and matter. One is *vitalism,* a philosophy that assumes that life is made possible by some force that is neither

chemical nor physical. The other is *mechanism*, a philosophy that assumes that life can be explained entirely in chemical and physical terms." [23]

Following discussion of Aristotle and Descartes, and the work of Priestley and Wohler, the student is lead to this conclusion:

"This is not to say that scientists proved there is no vital force, They showed that it was *unnecessary* to invoke a vital force to explain the data of the physiology of cells and organisms. Vitalism was not discarded: it became unnecessary in explaining biological activities." [24] (Italics added)

The purely mechanistic philosophy is very ingenuously taught without saying so in definite terms. In the teachers' manual we find these statements regarding this material:

"The basic idea of this chapter is the firm establishment of the fact that biological function is explicable in terms of the laws of chemistry and physics—the same laws, essentially, that apply to nonliving materials of the earth. , . . While not disproving the theory of vitalism, the conclusion is inescapable that physiological problems are approachable by the methods of chemistry and physics—that, in fact, they cannot be understood without resort to chemistry and physics," [25]

By means of suggestive questions the student is lead to believe that the mechanistic philosophy is *the* logical one and leaves the false impression that the mechanistic approach can be verified by experimental means. According to the BSCS writers the mechanistic method is all-sufficient. There is no compromise–no recognition that both factors can be involved in explaining vital functions.

Again, as in so many situations, the discussion is not complete. Much is made of the discovery that enzymes could digest foods in a test tube. No vital force was present, they say, but they fail to mention that in the living organism living cells produce the enzyme, the enzymes do not digest the protein of the stomach or intestinal wall until death takes place, and also parasites found in the digestive tract are not digested though they are protein. They do not suggest that both chemical and vital factors can be involved.

The theme of mechanism is taken up again in chapter thirty-six dealing with the origin of life. Note what is said about this in the teachers' manual:

"The basic issue is how science can account mechanistically for the origin of life." [26]

Similarity of the Texts

According to BSCS officials about seventy per cent of the material in the three books is the same. That becomes evident on studying the books. The approaches are different. The Green Version stresses ecology, the Blue Version gives more emphasis to molecular biology, while the Yellow Version gives more attention to the cellular level. In the main the same subjects are discussed but where one text devotes an entire chapter or section to one subject another may reduce the quantity to a few pages. For example the Blue Version devotes five chapters to theories of the origin of life and Oparin's Hypothesis of the origin of life and the evolution of the cell. The Green Version devotes only about two pages to Oparin's Hypothesis. The Yellow Version emphasizes the historical phase of evolutionary philosophy giving more attention to fossil evidence.

Conclusion

It seems clear that all three of these books are dedicated to the promulgation of total organic evolution to the exclusion of objectivity in biology, if need be, in order to eliminate any belief in fiat creation.

References

[1] Schwab, Joseph J. (Supervisor), *Biology Teacher's Handbook,* John Wiley and Sons, Inc., New York, 1963, p. 31.
[2] Ibid., p. 31.
[3] Ibid., p. 33.
[4] Ibid., p. 34.
[5] Ibid., p. 34.
[6] Ibid., p. 36.
[7] Ibid., p. 36.
[8] Ibid., p. 45.
[9] BSCS, *Biological Science: An Inquiry into Life,* Harcourt Brace and World, Inc., 1963, pp. 638, 639.
[10] Ibid., p. 641.
[11] Schwab. op.cit., p. 31.
[12] Schwab; op. cit.; p. 33.
[13] BSCS, *High school Biology,* Rand McNally and Company, Chicago, 1963, p. 572, 573.
[14] Ibid., p. .580.
[15] BSCS, *Biological Science: An Inquiry into Life,* Harcourt Brace and World, Inc., New York, 1963, p. 589.
[16] Schwab, op. cit., pp. 32, 33.
[17] Schwab, op. cit., p. 32.
[18] Kay, Marshall and Edwin H. Colbert, *Stratigraphy and Life History,* John Wiley and Sons, Inc., New York, 1965, p. 617.
[19] Andrews, Henry N., Jr., *Studies in Paleobotany,* John Wiley and Sons, Inc., New York, 1961, p. vii.
[20] Lanham, Url, *The Insects,* Columbia University press, New York, 1964, p. 19.
[21] Rensch, Bernard, *Evolution Above the Species Level,* Columbia University Press, New York, 1960, p. 267.
[22] Novak, Joseph D., "Conceptual Schemes and the Process of Science," NSTA Conference of Scientists, *The Science Teacher,* Oct. 1964, p. 11.
[23] BSCS, *Biological Science: An Inquiry into Life,* p. 65.
[24] Ibid., p. 91.
[25] BSCS, *Biological Science: An Inquiry into Life, Teacher's Manual,* Harcourt, Brace and World, Inc., New York, 1963, p. 8.
[26] Ibid., p. 102.

WAS ARISTOTLE AN EVOLUTIONIST?

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It is sometimes said that Aristotle maintained a doctrine of evolution. The statement is made both by people who believe in evolution, and wish either to support it with Aristotle's authority or to do him a favour by ascribing to him a popular doctrine; and by people, like ourselves, who disbelieve in evolution. My purpose here is to show that Aristotle never maintained any such doctrine at all. If it be asked what is the use of raising the question now, I reply that there seems to be no reason why we should ascribe to a man, even to one dead over two thousand years, views which we consider to be false, and which he never held.

Let it be noted first that, as Standen has pointed out, there are really two theories– "groups of notions" might be a better way to put it–in connection with which the term "evolution" has been used. As he said[1] ". . . it is really two theories, the vague theory and the precise theory . . . (the vague theory) points to the striking similarities in every detail, between the bodies of men and of the apes . . . it would seem to prove that all forms of life are connected in some way . . . The precise theory of evolution is that all forms of life on the earth today came from some original form of life by a series of changes which, at every point, were natural and explainable by science . . . (it) is much further from being proved than men are from flying to the moon."

Actually, Standen's "vague theory" should not be called "evolution" at all, any more than the noticing of the fact that Jones looks quite a bit like Smith should be called "genealogy." Nor should it be called a "theory"; if anything, it is just an observation, Since "evolution" literally means "unrolling," as a written scroll would be unrolled, the "vague theory" is merely the observation that we find some logical connection between the various lines written on the scroll. But the "precise theory" is more like saying that the first line wrote the second, the second the third, and so on. Let us, to avoid confusion, call what Standen called "the vague theory" by such names as "homology," "similarity" or "analogy."

Now Aristotle was a keen observer of "analogy." In "On the Parts of Animals" [2] he said ". . . many groups (of animals) . . . present common attributes . . . in other groups . . . analogous . , . some groups have lungs, others have no lung, but an organ analogous to a lung in its place; some have blood, others have no blood, but a fluid analogous to blood . . ." Many similar passages could be quoted. But he did not in the least go on to say that analogy implied a common ancestry; in fact, he seems not to have felt the need of any account of the "origin of the species."

He says[3] ". . . it is impossible that such a class of things as animals (as individuals) should be of an eternal nature, therefore that which comes into being is eternal in the only way possible, Now it is impossible for it to be eternal as an individual (though of course the real essence of things is in the individual)–were it such it would be eternal–but it is possible for it as a species. That is why there is always a class of men and animals and plants." And in another place[4] he said that coming to be (e.g. generation of animals) will never fail, for ". . . God . , . fulfilled the perfection of the universe by making coming to be uninterrupted . . . because that coming to be should itself come to be perpetually is the closest approximation to eternal being."

So Aristotle seems to have been inclined to believe that living creatures had existed from eternity in more or less their present form, and would continue to do so. Indeed he said[5] ". . . in connection with the origin of men and quadrupeds, if they were really "earth-born" as some say, they came into being in one of two ways: either it was by the formation of a scolex at first or else it was out of eggs."

He goes on to say ". . . if there really was any such beginning of the generation of all animals, it is reasonable to suppose it to have been one of these two: scolex or egg. But it is less reasonable that it was from eggs . . ." The translator adds here the note "This is, I believe, the only passage from which we can gather anything about Aristotle's views on evolution . . . He contemplates the possibility that man's ancestor was a scolex; he never thought that he might have been a monkey. Each species would have a separate beginning by spontaneous generation; they would not be related by descent from a common ancestor." (By "Scolex" Aristotle apparently meant something like an egg or larva, generated in some cases by adults of another kind, in others spontaneously.) Incidentally, the word "evolution" may be found in translations of Aristotle, but it will be found to mean development of the individual, not origin of the species.

So Aristotle's view was certainly not a Darwinian one. Indeed, Empedocles had earlier proposed something more nearly like "variation and

natural selection," and Aristotle commented[6] "why then should it not be . . . e.g. that our teeth should come up of necessity–the front teeth sharp, fitted for tearing, the molars broad and useful for grinding down the food—since they did not arise for this end, but it was merely a coincident result; and so with all other parts in which we suppose that there is purpose, whenever then all the parts came about just what they would have been if they had come to be for an end, such things survived, being organized spontaneously in a fitting way; whereas those which grew otherwise perished and continued to perish as Empedocles says his "man-faced ox progeny" did . , . yet it is impossible that this should be the true view. For teeth and all other natural things either invariably or normally come about in a given way, but of not one of the results of chance or spontaneity is this true." And in another place[7] "There are some too who ascribe this heavenly sphere and all the worlds to spontaneity. They say that the vortex arose spontaneously, i.e. the motion that separated and arranged in its present order all that exists. This statement might well cause surprise . . , Besides the other absurdities of the statement, it is the more absurd that people should make it when they see nothing coming to be spontaneously in the heavens . . ."

It seems clear, then, that Aristotle recognized–nay insisted on—the fact that all animals, indeed all living creatures, have similarities one to another. But the idea that their relation would be that of having common ancestors never occurred to him; and he, with his strong sense of purpose in everything, would have considered it ridiculous to say that their coming to be was through chance.

It may be remarked also that Aristotle was no friend of the "doctrine of uniformitarianism," which was not particularly new in his time. He said ". . . Democritus reduces the causes that explain nature to the fact that things happened in the past in the same way as they happen now, but he does not think fit to seek for a first principle to explain this 'always': so, while his theory is right in so far as it applies to certain individual cases, he is wrong in making it of universal application. Thus, a triangle always has its angles equal to two right angles, but there is nevertheless an ulterior cause of the eternity of this truth, whereas first principles are eternal and have no ulterior cause." [8] ("Ulterior" here of course means just "further," and is not used in any bad sense.)

Let us notice one point in conclusion. Aristotle was a pagan, without any of the advantages of revelation which the humblest Christian enjoys. If, then, he could see close enough to the truth to keep himself clear of godless theories, how much more ought Christians to do so?

[1] A. Standen, "Science is a Sacred Cow," E. P. Dutton & Co., Inc., New York, 1950 pp. 100-103.

[2] Aristotle "On the Parts of Animals" (Translated by W. Ogle) Book 1 Ch. 5 (Oxford vol. V, 645,[b] Random p. 657).

[3] "On the Generation of Animals" (Translated by A. Platt) Book 2 Ch. 1 (Oxford vol. V, 731[b])

[4] "On Generation and Corruption" (Translated by H. H. Joachim) Book 2 Ch. 10 (Oxford vol. II, 336[b], Random p. 527).

[5] "On the Generation of Animals," Book 3, Ch. 11 (Oxford vol. V, 762[b] & 763[a].)

[6] "Physics" (Translated by R. P. Hardie and R. K. Gaye) Book 2, Ch. 8 (Oxford vol. II, 198[b], Random p. 249.)

[7] "Physics" Book 2 Ch. 4 (Oxford vol. II, 196[a], Random pp. 243 & 244.)

[8] "Physics" Book 8 Ch. 1 (Oxford vol. II 252[a] & 252[a], Random pp. 358 & 359.)

Note added: There are two books which might be of some interest in connection with what has been written here. The first is "Aristotle Looks into Evolution" by J. T. Bergen, published in 1940 by Northwestern Publications, Minneapolis. I have not yet been able to read this work, since it is out of print and the company apparently out of business. It seems to be concerned, not to investigate Aristotle's views on evolution, but to apply his method of reasoning against the doctrine.

The second is: "Aristotle, Galileo, and the Tower of Pisa," by L. Cooper, published by the Cornell University Press, Ithaca, in 1935, This has not much to do with our obligation, as Christians, to believe the Scriptures, but it may have to do with our obligation, as Christians, to be fair.

The quotations from Aristotle are from the translation published by the Oxford University Press in the earlier part of this century, and completed in 1931. The citations "Oxford . . , etc." locate the references in the traditional way. Most of the references are found in the volume "The Basic Works of Aristotle" published by Random House, Inc., New York, in 1941. References are located in this volume by "Random" followed by the number of the page.

MORE EXTRAORDINARY ADAPTATIONS

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Introduction

The *perfection* of adaptation is a constant source of wonder to me. All this intricacy of adjustment can scarcely be necessary. Indeed, the evolutionist concedes this for he claims that less was good in its way and long served the species until better was attained. But when enough was good, why has the adaptation progressed to an ever finer finish until *superb* complexity and interadjustrnent became *the rule?*

Just as the good predicates the good artificer, so the best subsumes the best. Nature "showeth His handiwork."

Senses

The fire ant, *Solenopsis saevissima* (F. Smith), produces an odour trail that other fire ants will follow, by laying down the secretion of a special accessory gland released through the sting.[1]

Plants

Sensitive plants[2] have an organ called the pulvinus at the base of the leaflet and at the base of the petiole. At its centre is a strand of vascular tissue surrounded by a cylinder of thin-walled cells separated by larger intercellular spaces. In certain states the cells engorge and stiffen. Under other conditions fluid is secreted in the intercellular spaces and the pulvinus becomes flaccid, Groups of cells by themselves can become turgid or lax, producing bending of the organ. It can even lift a leaf against gravity quite readily—this being almost comparable to a muscular contraction.

The orchid family deserves attention, too. They are so variable that similar flowers can be found in different genera having unlike vegetative parts.[3] Dissimilar flowers are often seen in the same genus. In some of the polymorphic genera there is as much variation between individuals as between species. They are eccentric forms. Their seeds[4] are so minute they contain little or no stored food. They cannot survive alone, and after the first few days die unless a beneficial fungus forms a symbiotic relationship with them. This symbiosis is most marked in the saprophytic species, for their nongreen leaves cannot photosynthesize. These orchids are actually parasites on fungi. The flowers can take almost any form. There may or may not be spurs, and Darwin thought spurs implied nectar, but, really, few or none have nectar, In those which do it may appear *after* impregnation and so be of no use in attracting insects. The numerous and highly extravagant forms of processes on orchids seem to have no use but to assist in classification! The orchid lip is more variable than the rest of the plant only in some genera, Adam says, and illustrates this with pages of drawings. It is hard to find common ground, she admits, upon which to organize comment. The pollinia, even the pollen grains, differ remarkably. The heritable characters appear almost numberless. All this, too, in light of the fact that only 25 species of at least 10,000 have been studied thoroughly to date. In the orchid embryo only the first division is consistent in all taxa. In a few the second division is consistent—but in only a few. Natural and artificial intergeneric hybrids are known.

So here is the most variable plant family known, where every possible variation from root to symbiont to flower is recorded. It raises a host of questions about adaptation. Why are so many forms needed, all of them adequate? Why has no other family emulated the orchids? It is as if "Nature" was demonstrating its virtuosity here for no ascertainable reason. Why has no narrow standardization by "selection" been achieved here?

Symbiosis

The Portuguese man-of-war[5] is a whole colony of different organisms. One kind forms the float, one supplies the fishing tentacles and a third kind consists of the digesting gastrozoids. A fourth type of organism looks after reproduction. These types of creatures do not survive long after separation. The gas of the float is secreted by a sort of gas gland, as in the swim bladder of fishes. It can inflate a deflated float in minutes and apparently has a feedback mechanism controlling its activity. The resting gastrozoid is only 1 to 2 mm. in diameter but can expand to 20 mm. or more and can take up a small fish with the help of its neighboring gastrozoids. The tentacles carry batteries of stinging nematocysts. Normally these are inverted tubes, held closed by a trigger. If stimulated the tube everts and may extend 100 to 300 times the diameter of its capsule. The surface of the tube is studded with a variety of spikes and hooks, and at the same time the tube can sting with a toxic fluid, about 75 per cent as strong as cobra venom. But loggerhead turtles eat these jelly-fish nonchalantly and the small, gay fish, *Nomeus gronovii,* lives and feeds inside the tentacles. Its stomach may contain many nematocysts. It can be stung, but quickly recovers. Indeed, it is 10 times as resistant as other fish.

For Food

The woodpecker has a unique arrangement of its toes for grasping trees—two forward and two pointing back. The mid-feathers of its tail are very strong and by a curious adaptation these main supports do not molt until all the rest of the tail has been replaced and can hold the bird up on a trunk. It has an uncanny ability to locate insects under bark or through wood, probably by pecking, then listening *acutely.* It can hit hard wood as often as 100 times per minute but not get dizzy, for the woodpecker has a thick skull, a straight, hard, sharp beak, and powerful neck muscles. The bones between beak and skull are not rigidly joined as in most other birds but have a spongy connective tissue pad between, The tongue may be 4 times as long as the beak and can go around curves or bend to reach ants in their burrows. It is often pointed and has little barbs like fish-hooks on its tip. Often, too, it has a sticky substance on its end. This tongue can whip up over the bird's head and even snatch food from behind the head. The California acorn-storing woodpecker makes rows of holes in certain trees, then tamps acorns into them. These are stores to which it later returns year after year–and always to the right tree.

The archer fish[7] *(Toxotes jaculatrix)* is a living water pistol. It can aim a jet of water accurately at a range of 2 to 3 feet, and douse an insect it wants to capture. But this is only one minor way of securing its food. Hence the interesting question to evolutionists: if spouting is so unimportant to this fish, why has it been a factor in survival and selection and differentiation within the species? The propulsive force is produced by a sudden compression of the gill covers. The tongue lies along a groove in the roof of the mouth to make the bore of the water gun. But how does a fish below the surface discern and aim at small objects above the surface? Refraction is not a real problem, says Luking, because it fires nearly vertically and from close to the surface. For close prey it leaps to bite, and this it can do effectively because it has binocular vision and can direct its eyes forward to see close to the snout, The fish aims its jet just below its prey, detaching it by the rebound! Its eyes have an unusually large number of rods, giving it fine vision in dim light.

Solitary or predatory wasps[8] number hundreds of genera, Each species hunts just one prey, perhaps only one species or genus, and thus these wasps have a wide repertory of hunting techniques. The males live solely on plant exudates–only the females hunt, This host specificity, which can be very narrow, is odd since the larvae of the wasps can often develop normally on quite different prey than the mother brings to them, Wasps rarely make mistakes in the selection of their prey, Evans insists, yet in various parts of its range a wasp may select a different array of flies-or a wasp may change from one prey to another. The sequence of stereotyped actions of the attacking wasp varies in adaptation to the anatomy of its prey. It may be a single sting, if that is all that is needed for one large ganglion, as in many Homoptera, or it may be a series arranged to paralyze the jumping legs of a cricket before its other legs, or be inserted along the thorax and then underneath to catch the prolegs of certain caterpillars as well as the thoracic legs. The exact ganglion need not be penetrated precisely since the venom can diffuse into the appropriate muscles from a more random sting. The predator wasps are able to distinguish mimics that fool vertebrates regularly, such as tree hoppers or preying mantids.

Metabolism

In Hebron Fjord in Labrador supercooled fish live at 100 to 200 metres depth where the water is —1.7° C all the year round and below the freezing point of fish blood by 1°C. If brought to the surface and freezing is triggered by touching them with ice they freeze throughout and die. They survive where they are because there is no ice down there to trigger freezing.

Ross[9] tells of Mexican carpenter ants *(Camponotus abominalis)* who during the day keep caterpillars of a rare butterfly in closed burrows, a few ants staying inside to guard the precious larvae. The burrows are close to the latter's food plant. In the evening the guardian ants inspect this bush for marauders, then shepherd the caterpillars out to eat. The ants then jump on the larvae and drink their honeydew on the spot. When dawn approaches the ants herd the caterpillars down into their burrows again and seal these with mud pellets. They even guard the larva when it becomes a chrysalis. The caterpillars are never found where the carpenter ants are not seen and cannot live without them!

As the fish-like tadpole[10] changes into a frog its nitrogen excretion alters from 90 per cent ammonia to 90 per cent urea. The arginase needed to catelyze arginine into urea increases by 10 times during metamorphosis. Arginine derives from ammonia by a process demanding three enzymes. These increase likewise, by as much as 50 times, What a wonderful biochemical mobilization for life on land! The blood serum at the same time increases its albumin and so conserves circulating fluids. Tadpole haemoglobin readily loads oxygen and frog hemoglobin unloads it as readily. The former does not contain cysteine. The long vegetarian gut of the tadpole shortens in the insectivorous frog. Enzyme changes accompany this to handle the

new high-protein diet in the pancreas and bowel. The bull frog tadpole, like a fish, has purple porphyropsin in its retinal rods, but this changes in the frog to red rhodopsin. No adaptational reasons for this can be thought of, says Friedin. He concludes that the biochemistry of metamorphosis may not parallel the biochemistry of evolution precisely!

In the kangaroo the epitheliums of the embryo's mouth grows so intimately to the nipple epitheliums that the mouth is lacerated if the baby is forcibly removed[11].

Elephants and women and whales have attendants at childbirth, the latter (in whales) nuzzling the newborn whale to the surface to let it breathe.

All types of placentae occur in primates, our haemochorial type being shared with insectivore "lower" than the tree-shrews and with Tarsius. Indeed, it is very hard to outline a phylogenetic tree for the placenta, Rhodes regards the foetal circulation and its transition to extra-uterine life, the intrauterine foetal movements, and so on, as "fantastic adaptations" which shake his faith, "convinced evolutionist" as he is!

Odoriferous glands in mammals have nothing in common but their smell[12], They may be occipital (Arabian camel), suborbital (antelope), on the throat (Californian mastiff bat), scapular (fruit bat), sternal (opossum), lateral (shrew), dorsal (golden hamster), axillary (man), supracaudal (guinea pig), interdigital (ruminants), scrotal (potto), soles of feet (mice), anal or perineal (stoat, civet), preputial (musk deer, muskrat, beaver). The crocodile has them in its cloaca. Many are altered by hormones. They have been classed as pheromones,

The quarter-inch long Stenodus beetle[13] when attacked by a water-strider, squirts out a bit of detergent from its abdominal glands. This breaks the surface tension of the water in front of the attacker, which sinks, and a small wave pushes the Stenodus out of danger. Indeed, they can move as fast as 2½ feet per second due to their detergent, However, the protective powers of the Stenodus work only astern. On a frontal attack the water-strider wins.

Mead-Briggs[14] found that rabbit fleas, *spilopsyllus euniculi*, can produce mature eggs only when feeding on a pregnant rabbit. The eggs develop pari-passu with the rabbit pregnancy, *whenever laid*, and hatch when the rabbit gives birth. If the eggs are moved to an unsuitable rabbit they become smaller again. Cortisone given to the host matures the eggs of the flea. Hence vertebrate hormones such as hydrocortisone may play a role in the reproduction of blood-sucking arthropods!

Two moths, the corn ear-worm (Heliothis) and Abbott's sphinx (Lapara)[15] can raise their own thoracic temperature as much as 17° F. Certain antennary spines act as aerials to receive wavelengths of 1.7, 2.35, 6.0 and 8.6 microns, The compound eyes of certain moths act as sensitive radio-meters searching out specific hot points in the far infra-red range—hence their success in finding "hot" mates.

Luminescence occurs in more than half the zoological phyla. Some species of prawns and fish have both extracellular and intracellular luminescence. In deep-sea squids, prawns and fishes there are often accessory structures increasing the efficiency of the light organs (like bull's eye-lanterns). A mass of light-producing photocytes lie inside, and the front of the organ may have one or several lenses. The reflector in fireflies is probably urate crystals, and in fish platelets of guanine. In squids a pair of light-organs fits into the ink-sac, and in them are compartments holding luminous bacteria, with a reflector and lens. The ink-sac forms an opaque screen behind. The light organs of fishes can be located on the ventral body wall, lower jaw, or the wall of various parts of the gut. Since organs containing luminous bacteria emit light continually there are also appropriate devices for varying the light intensity or for screening it.

Scale-worms have luminescent scales which flash intermittently–may flash, too, when cast off from the body. Stomiatoid fishes from the ocean depths have a rotating mechanism which can turn the light organs down to conceal them. Of two fishes with large bacterial cheek luminescent organs, one, Anomalops, can rotate its organ thus but the other, Photoblepharon, draws an opaque curtain over it! Very different chemical compounds can be used in light production, as Nicol[16] points out. The luciferin of bacteria and of a marine clam, Pholas, can be somewhat similar, but in fireflies it is much different, and there is another type again in the minute shelled crustacean, Cypridena, or in the jellyfish, Aequorea. It seems that luminescence is a convergence phenomenon and has taken many chemical approaches. No one has yet offered a good reason for luminescence in minute protozoa. Perhaps it has sexual uses in some forms, or defensive purposes, or assists in keeping a shoal of creatures together.

General Comment

None is needed, really. When the Lord makes creatures or plants fit they are really fit [17,18].

Conversely, one thinks of the argument on "maladaptation," e.g. the horses before equus or the saber-toothed tiger. Apparently the early horses grazed side by side with equus for millions of years. That is good survival. And Gay-

lord Simpson says of the saber-tooth that if its teeth made eating difficult yet it took 40,000,000 years to starve it to death. It was not *badly* maladapted![19]

Adaptation is a long cadenza full of harmonics and arpeggios. It demonstrates the virtuosity of God.

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