

JOURNAL

of the

AMERICAN SCIENTIFIC AFFILIATION



The fear of the Lord is the beginning of wisdom. Psalm 111:10

Volume 2

Number 1

JOURNAL OF THE
AMERICAN SCIENTIFIC AFFILIATION

Vol. II No. 1

Marion D. Barnes, Ph.D.
Editor
511 E. Fifth St.
El Dorado, Arkansas

TABLE OF CONTENTS

Page		
	News Bulletin	
i,ii	Fourth Annual Convention	Erdman
1-15	Flood Geology	Kulp
16-19	Hole in the North	Hartzler
20-23	Biology and Christian Fundamentals	Mixter
24-27	Comments by the Editor	
28-37	Behaviorism and Philosophical Psychology	Ramm

- NEWS BULLETIN -

The 1950 Annual Convention will be held at Goshen College,
Goshen, Indiana, Wednesday through Friday, August 30 through September 1.
Committees for the convention are:

General Chairman

Dr. H. Harold Hartzler

Arrangements

Dr. Paul Bender, Chairman

Papers

Prof. Hendrik J. Oorthuys, Chairman

Prof. David M. Spaulding (West)

Mr. Delbert N. Eggenberger (Midwest)

Dr. Roy M. Allen (East)

Publicity

Dr. Edwin Y. Monsma, Chairman

Prof. Paul DeKoning

Dr. Irving A. Cowperthwaite

* * *

Officers elected for the coming year are:

President: F. Alton Everest

Secretary: Russell Mixter.

It will be necessary to ballot again for Vice-President.

FOURTH ANNUAL CONVENTION

"Unusual weather" highlighted the opening on August 22, 1949, of the Fourth Annual Convention of the American Scientific Affiliation, Inc. As startled Los Angelans tried to appear nonchalant beneath dark skies and undeniably wet rain, some 26 (?) delegates to the convention were registering in the lounge of the Bible Institute of Los Angeles, convention headquarters. Miss Leota Akey of Biola presided at this desk and rendered valuable service throughout the week.

This first informal contact at registration time renewed old acquaintances and began new ones, thus adding to the keen anticipation with which all of us had come. We were not disappointed. The climatic conditions proved to be only the first of many events which marked this convention as unusual. For example, enthusiasm so pervaded the atmosphere that the first paper was presented half an hour before schedule. This phenomenon occurred following appreciated words of welcome by Dr. Samuel H. Sutherland, Dean of Biola, a concise report on the status quo by Mr. Everest and an appetite-whetting preview of the convention program by Dr. Hartzler.

Discussion ran high as the program then began to unfold, and as always, there were spontaneous groups which carried on the discussion after each session. The several bus trips admirably provided time en route for us to expand the thoughts aroused by the papers. The new five-day span of the convention was thus extremely advantageous in that it provided a balance between formal and informal technical activity.

On Monday afternoon we initiated the series of bus trips to local points of interest. During the ascent to Mt. Wilson our emotions pivoted from tremendous scenic enjoyment to a certain wistful desire not to be quite so close to the edge of the scenery. The observatory itself revealed wonders to us, both from the standpoint of scientific data and of the instruments with which they are obtained. One of the most beautiful sights of all was purely incidental--Pasadena, far below, when dusk had come and the lights had gone on in the city. The trip closed with visits to two television stations where we were permitted to view the equipment necessary for telecasting.

The La Brea tar pits were the object of our attention on Tuesday afternoon. Dr. Hildegard Howard lectured to us with great clarity as we toured first the Los Angeles County Museum fossil exhibit and then the actual famous site of excavation whence the fossils had come. It was easy to visualize how the unlucky animals had been lured into the tar long ago, and had been trapped and preserved for posterity as skeletons.

Our one advertised public meeting (on Tuesday evening) was most favorably received. Dr. MacRae spoke at that time to a large audience in the Church of the Open Door on "New Light on the Old Testament." This type of lecture proved once again to be a valuable means of bringing the work of the ASA before the Christian public.

On Wednesday we journeyed to Palomar Observatory, stopping along the way to visit the old mission San Juan Capistrano, home of the swallows. The Pacific Ocean along highway 101 was obscured that day by a heavy mist, but as we turned inland and climbed upward we were treated to superb views of California scenery. During this time the executive committee braved bus sickness and held session in the very back while the rest chatted animatedly about astronomy, psychology, geology and theology.

The beautiful structure of the two hundred inch telescope awed even those of us who were not astronomers. We were privileged to see men working to polish a final two-millionth of an inch from the mirror. The machinery of the telescope was also shown to us, and we crawled into the mirror-silvering apparatus in a most undignified manner. In addition the group was taken to see the Schmidt telescope. Here were demonstrated the movement of the telescope and of the dome with its shutters, as well as the photographic technique.

By this time dinner was beckoning us quite urgently. Unfortunately Knott's Berry Farm was so distant that in spite of valiant driving we missed both the anticipated chicken dinner and the opportunity of seeing the Ghost Town; nevertheless, tasty ham and hot biscuits at 9:30 p.m. atoned amply for our disappointments.

On Thursday evening our president welcomed us as visitors to the Moody Institute of Science. Messrs. Keith Hargett and George Speake demonstrated some of the amazing equipment with which they present their programs all over the country. Next was a preview of the forthcoming film, "Dust or Destiny," which we were permitted to criticize with the purpose of making it completely clear and accurate. The final event of the evening was a conducted tour of the building which helped us to understand some of the processes which take place behind the scenes of film making.

Thanks are herewith proffered to all who had any part in the arrangements for all of these trips. Every convention delegate felt that they added a large measure of profit and enjoyment to our coming together.

Throughout the week we continually reaped the benefit of two other innovations, namely, the attractive individual name cards and the extremely helpful program folders. It is to be hoped that these have set a precedent for succeeding conventions.

The technical sessions need not be discussed here, as that phase will be fully presented elsewhere during the year. Those who acted as chairmen were admirable in the role, and they set an example for the future in keeping the discussion to one point. The absence of several of the authors of papers was a source of regret inasmuch as we thus failed sometimes to comprehend the full impact of their work and discussion was impeded. The presence of non-scientific visitors also tended to present difficulties in this line.

A word must be devoted to Clifton's restaurant. Circumstances for the most part prevented us from eating together as a group, but many did go to Clifton's for their meals. Thus some had the totally new experience of eating beside an indoor waterfall. Another ASA "first"!

Much more could be added to this reminiscence: the trials and tribulations engendered by the microphone by which the proceedings were being recorded; the attitude of true scientific investigation which was constantly in evidence; the spirit of friendliness; the satisfaction of knowing one another better; the convenience of our accommodations; the joyous power of the early morning prayer meetings. This was a smoothly run, well planned and extremely profitable convention. The deepest appreciation of all the delegates is extended to Mr. Everest, Mr. Stoner, Dr. Taylor, Mr. Spaulding, Mr. Rex, Dr. Hartzler and Mr. Ramm, as well as to all others who gave of themselves on behalf of the affiliation, and succeeded in making this our fourth convention a memorable one. And, of course, our thanksgiving rises to the Lord for making the meetings meaningful both to us, and, we trust, to all who are in sympathy with our endeavors.

DELUGE GEOLOGY

J. Laurence Kulp, Ph.D., Columbia University
New York, N.Y.

INTRODUCTION

General Statement

The theory of deluge geology is summarized by H. W. Clark, The New Diluvialism, Science Publications, 1946, p. 205 as follows, "The pristine earth was destroyed by one great overwhelming catastrophe, the Flood, the Deluge, of Genesis 6, 7, and 8 and that this Flood was the direct or indirect cause of most of the major geological features of the earth." This statement is in complete disagreement with the conclusions of trained geologists the world over who believe various strata have been deposited over tremendous periods of time according to known physical and chemical laws. Since geology as a science is concerned with the history of the physical and biological earth, it deals with a subject important to a Christian view of the world. Although a large proportion of the geologists of the 19th century were at least nominal Christians and suggested means of harmonizing the science of geology with the Scriptures, the field was soon lost to the rising tide of secularism. In the early 1900's George McCready Price wrote the first of a stream of books and papers on "Flood Geology". Because this view gave apparent support to certain popular interpretations of Genesis, Price's writings received wide distribution in evangelical circles. Numerous would-be apologists who wrote for the Christian public such as Rimmer, Nelson, O'Toole, Hamilton and others assumed Price's Flood Geology to be sound science and a weapon against evolution. This theory has grown and infiltrated the greater portion of fundamental Christianity in America primarily due to the absence of trained Christian geologists.

It is the purpose of this paper to present selected fragments of the geological evidence in terms of the physical and chemical laws which apply to geological processes and materials. The greatest difficulty in accomplishing such a purpose is the adequate visualization of geologic features. To understand geology rightly one must visit the fields, the mountains and valleys, and the seashores armed with a reasonable preparation in physics and chemistry.

Literature

The most complete account of flood geology by G. M. Price is to be found in his "The New Geology" 1923. (For fifty years the thesis has hardly been modified as in one of his latest, "Common-sense Geology" 1946.) In 1941 the Bulletin of Deluge Geology was started, edited by G. M. Price and C. B. Courville for further discussion and propagation of the thesis. This publication has apparently been replaced in 1946 by "The Forum" of which Volumes I and II comprising 130 pages over 1946-1948 have appeared.

Recently another point of view in flood geology has appeared in a book by Clark referred to previously. Clark differs considerably with Price in that he admits many of the accepted geological facts which Price denies. These admissions make flood geology even less tenable.

Training of the Exponents of Flood Geology

G. M. Price according to his brief autobiography in Vol. I. No. 4 of the Bull. of Flood Geology had two years at Battle Creek College in classics and theology.

Later he took a teachers training course at the Normal School in New Brunswick which included some elementary study in natural science. This ended his formal education.

The primary proponents of flood geology have been of 7th Day Adventist persuasion and have assumed from their theological tenets that a 6-10,000 year span is required for all life. Price writes in the above Bulletin, "From childhood I had always believed in the Flood and ... I had become convinced of what that book (Patriarchs and Prophets, Mrs. E. G. White 1890) teaches about the Flood as the cause of the chief geological changes." It is evident that he did not approach the subject without a preconceived pattern to which the data must conform.

The authors of the articles in the flood geology bulletins include two M.D.'s, one Ph.D. chemist who makes a number of incorrect statements on chemical principles, and the others who list no degrees. The other prominent writer on Flood geology is H. W. Clark who has a master's degree in biology. None of these men have done any geologic field work such as mapping or studying paleontological or structural sequences.

Basic Errors

There are four basic errors in the flood geology writings which appear persistently:

(1) There is confusion that geology and evolution are synonymous. The evolutionist does claim support from geology, and geology generally predicates at least physical evolution but geology itself is the independent science of the rocks of the earth's crust, their properties, origin, and history. The basic principles which geologists have discovered about the earth's crust can be developed without recourse to fossils.

(2) It is assumed that life has been on the earth only a few thousand years, therefore the flood must account for geological strata. A good example of this is the constant reference to the present as a "zoologically impoverished world." There are certainly many more animal types represented in the whole fossil record than are living. The present world is only "zoologically impoverished" if all these fossils lived at one time and were all destroyed by the flood. However if these lived in various times over 500 million years as seems to be the case, then the biological statistics of this era are little different from others. It is a case of assuming in a major premise that which is to be proved.

(3) The physical and chemical conditions under which rocks are formed and, later, under stress, folded are not understood. This accounts in part for the illusionary confidence of the sincere flood geologists.

(4) The historical perspective accounts for the continuation of basic error. Price first wrote before radio activity was applied to age measurement, before oil wells had penetrated over three miles of sedimentary strata and perforated certain parts of the sedimentary column like a sieve, before Hedberg's classic work on the conditions under which sedimentary rock will be formed, before Grigg's experiments on the plastic flow of rock under sufficient pressure and temperature, before M. King Hubbert's calculations defining the state of rocks while undergoing folding, and before extensive sampling and age measurement of the finely laminated, continuous, but very ancient deep sea sediments.

THE SCIENCE OF GEOLOGY

Uniformitarianism

Like other fields of physical science, geology assumes that the world about us operates according to law and order. Much has been written by Christians against "uniformitarianism" while actually we must believe in it. We believe God created the universe according to a blueprint and that it operates according to predetermined laws. While it is true that God may supersede any of these laws at any time, it is certainly not the normal course of events, nor is it perpetuated for any great length of time. Therefore in geology the present operation of erosion, transportation, sedimentation and compaction is the key to these actions in the past. The geologist does not believe everything that has happened to the earth's crust in the past can be identically duplicated today. He does believe that the present is the key to the past and that the same physical chemical laws have applied to all phenomena of geology. This is accepted generally by Christians for other sciences and should be extended in their thinking to the science of geology. Another viewpoint is represented by Prof. Monsma of Calvin College who distinguishes "creation" from "providence". He thinks we can accept the extrapolation into the past of most physical quantities as measured at present except time. Thus he would infer that phenomena such as radioactivity operated by different rules in the "creation" and have the present rules due to "providence". This view is considered unreasonable because it would require God to have changed hundreds or thousands of physical laws or situations all in different ways by different amounts to give a consistent appearance of great antiquity but actually all were created a short period of time ago. Thus radioactivity, the accumulation of the salt in the sea, the heat radiation from the earth, or the speed of light and the distance of stars, all indicate millions of years of earth history yet are all independent, depending for their observation on entirely different laws and events. So it will be assumed the rules haven't changed and that they can be applied.

Physical Chemistry of Rocks

Rock Types

There are ~~three~~ major rock types, igneous, sedimentary, and metamorphic. The igneous rocks which are those formed by a cooling silicate melt, intrude and cut the other two types of rock. The most common igneous rocks are granite and basalt. Sedimentary rocks are made up of particles derived either from the erosion of previously existing rocks or by chemical or biological precipitation. The major types of sedimentary rocks are shale (mudstone), sandstone, conglomerate, and limestone. There are many minor varieties and combinations of these four. From shale through sandstone to conglomerate the difference is primarily in particle size. Either igneous or sedimentary rocks may, under sufficient temperature and pressure become changed into metamorphic rocks. If this change is carried far enough, fossils are destroyed and still further many of the characteristic sedimentary features are obscured.

Formation of Sedimentary rocks

The first stage in the formation of a sedimentary rock is either erosion by chemical or mechanical means of previously existing rock, or in the case of chemical sediments, of precipitation by some chemical agency. First consider the detrital

rocks-shale, sandstone and conglomerate. Whether the material is derived from chemical decomposition or mechanical abrasion, the process is extremely slow. Consider granite tombstones. How much has been chemically decomposed in historic time?

After material is broken up by mechanical or chemical means it must be transported by wind, ice or water. It has been determined that for sand and gravel the size of the particle that a stream can carry varies with the sixth power of the velocity of the stream. Thus the larger particles are quickly segregated on the basis of speed of the carrying medium. Fine particles of colloidal dimensions are carried in suspension by sluggish rivers and are precipitated only upon entry to the ocean water rich in electrolyte. Far out from shore, over the continental shelves there is very little sediment. Over these areas rates of sedimentation are so slow that a few feet may represent several hundred thousand years of continuous deposition. (See papers by W. D. Urry in Bull. of the Geol. Society of Am. and Am. Journ. of Science). The sedimentary rocks of the earth's crust were not produced by such deep water sedimentation but rather along continental shelves and in great inland seas such as the present Gulf of Mexico and Hudson's Bay. Offshore, where detrital material is lacking, limestone may form if the sea is sufficiently shallow and warm. Some limestones consist largely of shells of organisms but the bulk of the limestone in the sedimentary strata is in large part chemical precipitate. It must be emphasized, contrary to statements by flood geologists, that practically every sedimentary rock type known can be shown in the process of formation today with or without fossils.

After obtaining the detrital material and transferring it to a place of deposition such as a river delta, how does this loose mud become rock? Hedberg's great work in Venezuela elucidated this process under typical conditions. (Am. Assoc. Pet. Geol. Bull. 10, p. 1035 and later Am. Jour. Science (1936) p. 241.) He was able to study the gradual compaction of river mud into hard rock shale with oil well cores. The area he chose is well known geologically from the intensive drilling. No essential change in sedimentation type is observed for two miles vertically in this area. Hedberg demonstrated that loose sediment must have at least a mile of additional sediment piled on top of it to lithify it. A mile of water will not suffice because the rock forming process is one of squeezing out water. Additional work by other scientists has confirmed these findings and further shown that essentially similar thicknesses must be applied to limestone and sandstone. Here then is a quantitative measure of the rock forming process. When we see a sedimentary rock on the surface, it must of necessity have been at least a mile deep in the earth's crust at some time in its history. Therefore if we observe a great thickness of sedimentary rock such as along the Rocky Mt. Front which has been folded and eroded to yield a much younger conglomerate, it is known that rocks were already lithified before this erosional process for the second cycle and had been covered by at least a mile of additional material which has been eroded off. The time dimension is large for such a process.

In Price's writings, the statement is frequently made that the fossiliferous strata are relatively thin. For example in Vol. I No. 4 of the Deluge Bulletin, "Everyone knows that the fossiliferous strata are seldom more than a mile or so in total thickness - often only a few hundred feet and below them is granite or primitive rocks which contain no fossils." The "everyone" in this statement must not include geologists for it is well known that in the various geosynclines and basins of sedimentation there can be found up to 20,000 to 30,000 feet for each geologic period. (For the relations of the various geological periods to each other as they are mentioned in the discussion, see Table 1.) Strata in the northern coast of

Table 1
Geological Time Table
(as generally accepted)

Era	Period	Epoch	Date
Cenozoic	Quaternary	Recent	1,000,000
		Pleistocene	
	Tertiary	Pliocene	
		Miocene	
		Oligocene	
		Eocene	
Mesozoic		Paleocene	
	Cretaceous		60,000,000
	Jurassic		
	Triassic		
Paleozoic	Permian		200,000,000
	Pennsylvanian		
	Mississippian		
	Devonian		300,000,000
	Silurian		
	Ordovician		
	Cambrian		500,000,000
Cryptozoic (Pre-Cambrian)	Keweenawan		
	Huronian		
	Timiskamian		1,000,000,000
	Keewatin		

Gulf of Mexico have been demonstrated by oil wells and seismic methods. A simple calculation will show that were all of the soil and loose rock in the U. S. A. bulldozed into a basin the size of this Gulf Coast geosyncline, it would hardly be full. But this basin is only one of dozens throughout geologic time and this represents only the time from Cretaceous to the present. Table 2 shows the total thicknesses (maximum) of sedimentary rocks observed in the Frazer Geosynclinal belt, which trends from So. California to Alaska, for each geologic period. It should be obvious that no flood of short term duration could possibly account for these strata.

These great accumulations of sediments occur due to the filling of subsiding basins called geosynclines. One of these geosynclines is commonly truncated by another at a later time. In any particular period the sequence of sediments in the geosyncline is normally (1) conglomerate, (2) sandstone, (3) shale, (4) limestone.

The origin of coal, when the evidence is understood, also precludes flood geology from being correct. Coal is found in every period of geologic time but is most abundant in Central North America and England during the Carboniferous. That coal results from the accumulation, compaction, and alteration of plant debris has been demonstrated without question. There are two theories of origin, one that the material accumulated in situ where the vegetation grew and fell, the other that the material was transported. Most all deposits can be shown to fall into the first type - certainly all those of large areal extent. Since it takes a hundred feet of loose vegetable matter to form one foot of coal it can be readily calculated that if all the vegetation were scraped from ten times the area of the midwest coal fields and compressed in this sedimentary basin it would only supply enough plant matter to make a few of the thirty significant coal horizons.

The evidence for the in situ origin of coal beds is voluminous but a few items will be presented to show the nature of the data. Further details can be obtained by examining the scientific literature on coal or referring to some standard work on the subject such as Coal, by E. S. Moore published by Wiley, 1940.

1. There are large accumulations of vegetal matter forming in swamps at the present time, some of which, as the Great Dismal Swamp of Virginia and North Carolina, or the many large swamps of Sumatra, are on a scale approaching those which gave rise to coal seams of considerable extent.

2. The purity of the coal, its freedom from mineral matter suggests the collection of the vegetation in swamps rather than in deposits where it has been transported with other sediments.

3. Numerous tree trunks with their roots firmly embedded in the underlying clays occur in the coal seams and in some cases the rootlets pierce fragments of buried wood in the clays.

4. Old soils on which the trees grew lie beneath the seams in some places.

5. The arrangements of various portions of plants with respect to one another is not, as a rule, that of transported material.

6. The lenses of cannel in bituminous coal indicate patches of open water in swamps where spores would collect in great quantities rather than deposits forming part of an ordinary sedimentary formation.

Table 2

Maximum thickness for various periods in the Frazer
Geosynclinal Belt (So. California to Alaska)

<u>Period</u>	<u>Maximum Thickness</u>
Cambrian	12,000 feet
Ordovician	10,000
Silurian	14,000
Devonian	8,000
Mississippian	15,000
Pennsylvanian	5,000
Permian	15,000
Triassic	25,000
Jurassic	28,000
Cretaceous	13,000
Tertiary	15,000
<hr/>	
Total	160,000 feet or about 30 miles

Many minor features give the geologist important information on the origin of certain strata. Example (1) Gravels deposited by streams are generally clearly graded in texture and the pebbles are rounded in proportion to the distance from their source. Glacial gravels on the other hand are poorly sorted and commonly show parallel striations caused by being dragged over abrasive surfaces. These markings are never found on water carried pebbles. (2) The peculiar rare and heavy mineral aggregates may distinguish one source area from another for the detrital material used in making up the rock. (3) Glacial varved clay could occur only under the unique physiochemical conditions of low electrolyte glacial melt water which rushes into glacial lakes during the summer and is very quiet with an ice cover during the winter which permits slow sedimentation of the colloidal fraction. This has been demonstrated both in the laboratory and by sampling over a period of years of present day glacial lakes. There is no question any longer that glacial varves are annual. (4) Conglomerates are most interesting in that they contain pebbles of sedimentary rock which has already become lithified and which due to warping or folding has been exposed to erosional agencies. Conglomerates which rest on an angular unconformity generally show pebbles of all of the underlying tilted beds.

Fossils

Fossils occur sporadically in sedimentary rocks. Many thick formations contain no observable fossils while others are richly fossiliferous over large areas. This is due to the type of deposition and the nature of the life entombed. Along present shores the same variation may be observed. A recent three foot high wave cut bench cut in unconsolidated sand at Jones Beach, N. Y. gives a beautiful exposure of undisturbed shells in the sand awaiting further burial. The appearance is that of a fossiliferous sandstone. Off the Florida coast and around the Gulf, away from large deltas, fossiliferous lime muds are undergoing compaction into limestone. The end product will duplicate any fossiliferous limestone of the Ordovician system except for the fauna.

Much has been made of the geologist "reasoning in a circle". It is said that the geologists assume that evolution is true and thus dates the rocks primarily by the fossils that are in them. He simply makes the simpler fossils and the less complex, younger. This is a misrepresentation of the situation. While it is true that the geologist will tentatively label a rock as Cambrian because it contains certain distinctive fossils, he does not do it because he accepts evolution. He does it because hundreds of thousands of careful observations have shown that for large periods of time, or if you please, for thick sequences of rock, there has been a definite fossil sequence which is the same the world over. While gaps in the record occur locally, and these are expected of an unstable crust which with its buckling and doming allows sedimentation at one time and erosion at another, the sequence observed is always the same so long as undisturbed sedimentary strata are dealt with.

Orogeny

The geologist has excellent evidence that during the past the earth's crust was not static but constantly changing. Such changes are still going on but at a very slow rate. The Scandanavian peninsula for example, is emerging from the water at a measurable rate. Similar observations have been made on many parts of the earth's crust. In the rock strata these broad warps or narrower intense welts are shown by basins or troughs of deposition where the sediments are much thicker than

in immediately adjacent areas. Invariably after a certain period of deposition either a broad warp or compression folding brings these rocks to the surface where erosional agencies can act on them. Subsequently they are again depressed and the new sediments truncate the old at some angle. Such is called an angular unconformity (or nonconformity) and since it commonly involves first the planing off by erosion of the tilted strata prior to deposition of the next cycle (which in each case recall must be superseded by at least a mile of sediment) a considerable time, far more than that available to historians, must be admitted.

The Flood geologists attribute such folding to soft muds and sands produced by the deluge. Physically this is impossible. M. King Hubbert, Director of Geophysical Research for the Shell Oil Company contributed an excellent theoretical investigation on the matter of scale models. He showed that in order for any laboratory attempt to reproduce earth conditions, it must keep all the dimensions of the model to scale. By using the known viscosities of solid rock at the temperatures and pressures of 5 to 10 miles in the earth's crust, it can be shown that the comparable scale model material for a laboratory compression experiment would have to be modeling clay or shoemakers wax. Experiments with these materials under controlled conditions have produced Appalachian type folding, and in general the type of deformation observed in rocks. If the sedimentary rocks were once unconsolidated debris at the same time and the entire muddy mass was subjected to compressional stress the result would be a chaotic mixture of material. The laboratory model to scale would be observed by squeezing a rubber flask which contained a layered mixture of alcohol and water. It would simply mix and spill out as a more or less homogeneous mass. Nothing of the type of thing observed in folded rocks could be obtained.

Other objections to the compressed mud suggestion is that the shear and tension fracture patterns can only be interpreted in terms of essentially solid rock. Further if the deformation has gone very far, high temperature and pressure minerals take the place of those of sediments. Pressure and temperature gradients are sufficiently well known for the earth to know that these minerals can only be produced at considerable depth on a regional scale. Also most of these intense metamorphic minerals are anhydrous.

Griggs, in his various articles in the Bull. of the Geol. Soc. of Am. and elsewhere, further showed by laboratory experiment that if rocks such as granite and limestone were subjected to confining pressure and temperature equivalent to great depths, the rocks would deform plastically to give the type of material found in nature.

Thus, strata is first lithified at considerable depth. Subsequently, subject to greater depth plus compressional and tensional stresses, it is deformed to yield folded rock strata so commonly observed by the geologists in the areas of orogeny (folding).

Price has claimed repeatedly that recumbent folds or thrust faults have been invented by paleontologists simply to save face when the fossil sequence was reversed. He says "In all examples of this sort (reversal) which are now known from all parts of the world, the physical evidence of the strata gives no indication of anything abnormal." By "anything abnormal" he means folding or thrust faulting on a large scale. To such an unwarranted assertion the person who wishes to evaluate the question must go map the rocks for himself. The fact is that such faults occur only in belts of obvious intense deformation which make up only a very small fraction

of the sedimentary column. Commonly described areas are the Alps, Scottish Highlands, Appalachian-Taconic region, and the Canadian Rockies. Price always refers to a statement by McConnel of the Canadian Survey Report of 1886 on the Structure of the Canadian Rockies which emphasizes the conformability of the pre-Cambrian limestone on top of the Cretaceous shale. Price then claims on this basis that thrust faulting is a fiction. The difficulty is that he has listed a small part of the quotation which gave clear evidence for such thrusting. A more complete quotation from the report follows:

"The fault plane here (in the Bow Valley) is nearly horizontal and that two formations, viewed from the valley, appear to succeed one another conformably. The Cretaceous shales are bent sharply toward the east in a number of places, but with this exception have suffered little by the sliding of the limestone over them, and their comparatively undisturbed condition seems hardly compatible with the extreme faulting which was necessary to bring them into their present position. They are, however, very soft, and doubtless owe their immunity to this fact. It is otherwise with the overlying limestones, which have been strongly corrugated in many places, and are often whitened and cracked in the vicinity of the fault plane, the cracks have been subsequently filled with calcite. Enclosed argillaceous beds have been turned into schists and the banded appearance of much of the limestone is, no doubt, due to the shearing caused by the thrust. The limestones west of the fault are often bent by their pressure against the beds on the eastern side into a succession of sharp folds and are occasionally completely overturned. They also show disturbances in the altered and cracked appearance of the strata in the immediate vicinity of the faulted line."

The mobility of such shale has been demonstrated in the laboratory. 70 years of additional detailed mapping in the Canadian Rockies has thoroughly confirmed the thrust faults - on physical not paleontologic grounds.

The Time Dimension

The time required for these processes to yield their results is obviously the most critical in the whole discussion. If the various rocks labelled Cambrian, Ordovician, Silurian and so on can be shown to have been formed at 500 million, 400 million, 350 million years ago respectively there could no longer be any argument about the flood doing the work 6000 years ago.

In geology there are numerous evidences of great antiquity. Some of these have already been mentioned. Relative ages are agreed on by all, flood geology writers included. The clear superposition of strata in undeformed areas is sufficient. For absolute time, recourse must be made to other features. Qualitative indications can be made from rates of weathering, rates of mechanical erosion and sedimentation, the number of unconformities in a sequence indicating uplift and erosion, rates of deformation, rate loss of heat from the earth's surface, accumulation of salt in the sea, etc. In Yellowstone Park there is a stratigraphic section of 2000' exposed which shows 18 successive petrified forests. Each forest grew to maturity before it was wiped out with a lava flow. The lava had to be weathered into soil before the next forest could even start. Further, this is only a small section of the stratigraphic column in this area. It would be most difficult for flood geology to account for these facts. Price suggests that vulcanism is due to coal burning underground which is being formed from vegetable matter trapped during the flood. This would mean that hundreds of times the total world coal reserve must have been used in melting rock at depth to account for the prodigious thickness of volcanic rocks through the stratigraphic section. A chemist might inquire where the oxygen came from for the combustion.

There is an interesting unconformity bordering the San Joaquin Valley in California. The Pliocene Tulare formation was deposited on older sedimentary beds, later folded back on itself, then was eroded level so that Pleistocene sediments could be superimposed. After more than a mile of this material was laid down the whole area was tilted and eroded to give the present relationship. This is one more of the excellent qualitative evidences for the great antiquity of these formations.

Evaporites

One of the most convincing arguments of a qualitative nature of the antiquity of sedimentary strata is derived from a study of the gypsum and salt content of the strata. Great thicknesses of gypsum and salt occur in several places in North America such as the Silurian strata of Michigan or the Permian of West Texas and New Mexico. In the latter area the gypsum alone totals around 1500 feet in thickness. It is not continuous vertically but some of the pure gypsum beds may be several tens of feet thick. The beds have an areal extent of thousands of square miles and are underlain and overlain by fossiliferous sedimentary strata. Gypsum is formed by precipitation of the salt out of ocean water under intensely arid conditions. The presence of large bodies of salt therefore means long time evaporation in restricted bodies of salt water with continual subsidence of the land. Since the evaporation of 1000 vertical feet of sea water yields only 0.7 foot of gypsum, it would take a body of water some 450 miles high to evaporate out the amount of gypsum found in the West Texas Permian basin. This can only mean continual influx of ocean water plus sustained evaporation. Such natural salt pans are numerous in coastal areas of arid regions. The Gulf of Karabugaz, on the eastern side of the Caspian Sea, is a well-known example of concentration of salt water behind a bar with a narrow shallow inlet. Here amid the surrounding deserts, evaporation is so rapid that a current flows continuously from the Caspian Sea into the Gulf augmenting the Gulf waters with some 350,000 tons of salt daily.

An idea of the rate of evaporation can be obtained from the Dead Sea where careful measurements show an evaporation of 10' of water per year. Since this is the fastest evaporation measured it will be applied to the West Texas case. Here about 5,000,000 feet of water must have been evaporated. This would require 500,000 years as an absolute minimum. Recalling that these gypsum layers are intercalated, underlain and overlain with fossiliferous sedimentary rocks measuring up to four or five miles in total thickness, great spans of time are essential for any rational interpretation.

Quantitative

The only quantitative methods of getting absolute time are based on radioactive isotopes in the earth's crust. While much remains to be done in the refinement and development of technique, it is thoroughly established that approximate absolute dates may be put on rocks with as much theoretical justification as the weight of an object by a balance.

The method is very simple in principle. All radioactive atoms of a particular specie of an element disintegrate at a constant rate characteristic of that particular specie or isotope. This rate is unaffected by any temperature, pressure, electrical or magnetic fields, mass, impurity, or indeed anything that could be done to the atom under normal surface conditions. It can be calculated that these rates

do change as stellar temperatures of the order of millions of degrees are reached. But such temperatures the earth has never known since it was a separate body in the universe. The various geochemical processes in the earth's crust tend to separate one element from another, thus it is that uranium is found in the mineral uraninite or pitchblende while lead is found in galena. The uranium in the uraninite crystal so formed from ore solutions emanating from the depths of the earth's crust was disintegrating throughout its history at its constant rate but the lead being produced was constantly separated from it by these chemical processes at depth. The result is that when the uraninite crystal forms it is essentially free from lead and hence as it continues its constant disintegration lead accumulates. Thus when a geologist finds such a crystal and brings it back to the laboratory an analysis for uranium and lead coupled with a knowledge of the rate of production of lead gives him the age since the uranium crystal was formed. Since such crystals are found in ore bodies which crosscut other rocks, the other rocks must at least be older than this date. But what if the uranium crystal was in some way contaminated with some common lead from somewhere. This simply means a little more work. Ordinary lead has a different isotopic composition from uranium lead and hence by mass spectrometer analysis the presence and percentage of ordinary lead can be measured. Actually on most uraninite specimens, four independent age measurements can be made. There are present the two uranium isotopes, U238 and U235 as well as thorium isotope 232. Each of these isotopes has a known long half life (the time for half of the material to disintegrate) and each yields its own specie of lead. Further, since the ratio of U238 to U235 is constant, but the rates of decay are different, the ratio of the lead produced from U235 to that produced from U238 changes in a known way with time. This is the fourth independent age measurement that can be made on the same specimen.

Hundreds of measurements of uranium-lead ratios have been made. In all cases the ages have been in agreement with the order already worked out by geologists on the basis of stratigraphy and structure. An idea of the precision of the method is shown in Table 3 which gives the measured ages of the Marechalite pegmatites of the Baltic shield in N. E. Karelia. The specimens come from four different pegmatites and were analyzed by three different chemists.

The uranium lead method has yielded ages of rocks from early pre-Cambrian to Pliocene.

Radioactive age determinations are not restricted to uranium-lead ratios. The heavy radioactive elements give off helium in the course of their series, decay to lead, and this is trapped in the crystal lattice. Thus a helium-uranium ratio should also give the age of the mineral. With helium, however, there is the possibility of leakage throughout geologic time. It has been shown that certain minerals such as magnetite retain their helium almost completely while others have known leakage rates. In general the helium age would be a minimum age. Two important conclusions come out of the helium work to date. (1) For a given rock type the relative ages of rock strata from all over the earth agree with the accepted geologic labels and show Paleozoic rocks to be of the order of hundreds of millions of years old. (2) The smaller number of very carefully measured specimens on minerals which retain their helium 100% are in complete agreement with uranium-lead ages. Again much work of refinement and of technique and the amassing of more data is going on but the method has been demonstrated to be valid by the hundreds of consistent results obtained.

In addition to these methods there are a number of others which are entirely independent but which give identical results. One of the most promising of the

newer methods is the measurement of the rubidium 87 - strontium 87 ratio. Rubidium 87 decays to strontium 87 with a half life of about 5×10^{10} years hence can be used to date the older rocks. Ordinary strontium is dominantly strontium 88 and hence by mass spectrometer analysis the radiogenic (i.e. from rubidium) can be separated from common strontium. The amount of radiogenic strontium, of course, is alone used for the age ratio. Further, methods are being developed for the direct dating of sedimentary rocks.

A recent symposium on these methods published by the ASA gives details on the various methods and contains a bibliography of the more important scientific papers dealing with the subject. Anyone unconvinced of the validity of the radioactive method of dating should study these papers following the mastery of a book on the elements of radioactivity or nuclear physics.

Within five years most of the important stratigraphic sections will have been dated in absolute time to an accuracy of 25% of the true age. The dates will range from the present back to earliest pre-Cambrian (ca. 2,500,000,000)

Mechanisms of Flood Geology

G. M. Price suggests a shock from outside the earth (astronomical) which might cause great tidal waves sweeping twice daily around the earth from east to west at speeds up to 1000 m.p.h. at the equator. After the waters started receding climatic conditions would be so altered that for centuries there would be increased rainfall causing faster erosion than today. Further he assumes the clouded conditions produced cooling and glaciation. The alternative that Clark suggests is that the initial geography of the earth was that of a low broad flat area with low narrow seaways which are supposed to correspond to presently observed geosynclines of deposition. He appears to want less exciting conditions. He offers strong rising currents along narrow waterways to account for the stratified rocks. Since Clark admits of the universal fossil sequence he can use quieter water. He says the sequence is simply an ecological one with the animals that lived at lower altitudes being engulfed first.

All of the potent objections to flood geology presented previously apply to both of these views. There are a few additional facts which remain to be considered. Since the important sedimentary rock types are being formed today under observable conditions it is reasonable to assume that 1000 m.p.h. tidal waves would cause a very different result. Such a process would, it seems, continually mix and remix in the most chaotic fashion the soft materials of the earth's outer surface. It would do relatively little to solid rock and certainly could not be called on to produce miles of thinly laminated colloidal sediments, nor is it reasonable to assume that the fossils would be unbroken lying in neat horizontal layers as is the usual case. The fact that deep sea caves show extremely slow unbroken sedimentation of a most delicate sort back hundreds of thousands of years by radioactivity measurements also precludes wildly rushing water. But then, if quieter water is assumed where is the detrital material to fill even a few of the great sedimentary basins? Why should most geosynclines show the sediments to coarsen to the uplifted side or sides showing clearly that the materials which fill the basin were eroded from the adjacent land mass and that solid rock was being eroded largely by chemical weathering which would play no part in a flood since it involves oxidation and the slow action of carbonated water on the insoluble silicates. If the fossiliferous strata are simply a reflection of ecological zones why are ocean and continental deposits constantly interlayered after the other throughout the geological column. All Tertiary rocks are certainly not continental.

Table 3
Ages from Uraninite Specimens from Marealbian Pegmatites
Baltic Shield (Report of Comm. on Geol. Time 1946-1947 p. 43)

<u>Sample No.</u>	<u>Apparent Age in Million Years</u>
1	1760
2	1760
3	1795
4	1790
5	1795
6	1760
7	1710
8	1700
9	1715
10	1750
11	1800
12	1805
13	1730
14	1790
15	1805
16	1800
17	1775
Average	1770

Those that contain the mammals are continental--because mammals generally live on land but there are deep water Tertiary deposits as well as deep water and shallow water Cambrian deposits. The difference is that in the continental Tertiary deposits mammal bones are found whereas in continental Cambrian rocks no such are found. Whether a rock is continental or marine in origin can be determined by the mineralogy independent of the fossils it contains.

Finally it might be of interest to observe the effect of large tidal waves, the tsunamis of the Pacific. During a tsunami the water often rises very much like a tide so that erosion which accompanies the wave may come largely from the rushing back of the water down the slope or from the ordinary wind waves which ride in on top of the tsunamis and which are able to attack an area that has not been adjusted to wave attack and may, therefore, yield very rapidly. Sand dunes and earth embankments inside the beach may be greatly truncated but the beach outside this eroded area may show little sign of change in profile. Many such cases were found in the Hawaiian Islands after the tsunami of April 1, 1946. Two features claimed by flood geology are emphatically not observed even in miniature in tsunamis action. (1) Solid rock is not appreciably eroded. (2) Sedimentary deposits similar to that which could form rocks like those observed in the geological sequence are not formed.

Conclusions

1. The theory that a relatively recent universal flood can account for the sedimentary strata of the earth is entirely inadequate to explain the observed data in geology. The major propositions of the theory are contradicted by established physical and chemical laws.
2. The science of geology precludes certain interpretations of Genesis but does not make impossible acceptance of plenary inspiration of the scriptures.
3. This paper has been negative in character because it is believed that this unscientific theory of flood geology has done and will do considerable harm to the strong propagation of the gospel among educated people. On the positive side it is important for the Christian geologist to carefully study the truly superficial erosional and depositional effects on the earth to obtain evidence on the extent and nature of the flood of Noah.

THE HOLE IN THE NORTH

H. Harold Hartzler, Ph. D.
Mathematics Department
Goshen College

Where is the north? From the point of view of one interested only in the earth, that question is easy to answer. The earth revolves on its axis once in each twenty-four hours. Now if one faces the direction of rotation, then his left hand will be toward the north and his right toward the south. If one then travels in the northward direction he will eventually reach the point where the axis of rotation intersects the surface of the earth. This point is called the north pole and is as far north as an earth bound inhabitant can go. Therefore this must be the north.

However from the point of view of the universe of stars, the answer to the above question is somewhat more difficult. If we extend, in our imagination, the axis of rotation of the earth indefinitely far in the northward direction, then any point along that axis might be said to be in the north direction. This would be quite satisfactory in defining north if the earth did not have a number of additional motions other than the rotation on its axis. First of all the earth revolves about the sun keeping its axis of rotation inclined at an angle of $66\frac{1}{2}^{\circ}$ to the plane of its orbit. The path of the earth about the sun is elliptical in form, the sun being at one of the foci of the ellipse, and its average distance being approximately 93,000,000 miles. As a result of this motion, the position of the line of north would travel in an elliptical path among the stars at the rate of about 18 miles per second. The extreme variation in the direction of north due to the revolution of the earth about the sun amounts to approximately 186,000,000 miles. Since this distance is not very significant from an astronomical point of view, it might be dismissed as of no consequence.

Due to the fact that the earth rotates on its axis there is a large centrifugal force acting upon its equatorial region. This force acting over a considerable period of time has caused an equatorial bulge in the shape of the earth so that the radius of the earth is less when measured along the axis of rotation than when measured from the center to the equator. Now the plane of revolution of the moon around the earth does not lie in the plane of the equatorial bulge of the earth with the result that, due to gravitational attraction, the earth is given a slight rotation in a direction different from that of its daily rotation. This results in a precession of the axis of rotation of the earth just as the axis of a spinning top precesses. Due to this precession, the north pole of the earth slowly rotates in a circle. If we now consider the north point as the point on the celestial sphere (whose radius is infinitely large) where the axis of the earth extended from the north pole cuts this sphere, then we have the result that due to precession, this north point rotates, having a radius of $23\frac{1}{2}^{\circ}$ on the celestial sphere. The time required for a complete revolution is about 26000 years. At the distance of the bright star Deneb, in the constellation of the northern cross, the resulting change in position of the north point would amount to about twenty thousand billion miles or more than 327 light-years. A light year is the distance light travels in one year which is approximately six million million miles. So in addition to revolving around in a rather small ellipse, the north point also revolves in a large circle. Therefore to speak of the north as a position in the starry heavens is rather misleading.

Furthermore the sun, together with the whole solar system including the earth, has two other important motions. One is in a straight line at the rate of 12 miles per second in the direction of the constellation Hercules. This motion is inclined at an angle of 60° with the north direction. Thus this motion causes the north point to move rather rapidly with respect to the stars. Finally, the galaxy of stars in which we live, known as the Milky Way is rotating; with the result that the sun together with the whole solar system is traveling toward the constellation Lyra with

a velocity of 180 miles per second. This direction is also inclined to the north at an angle of approximately 60° , so this fact again causes the north point to move very rapidly among the stars.

Thus we have shown that it is improper to speak of some point among the stars as being the north point. Speakers and writers who do so should take an introductory course in Astronomy. The following quotation is taken from a small booklet by William Pettingill entitled "Is Heaven a Place?" "How significant it is, too, that the geographic and magnetic poles of the earth are always kept pointing north. Who can tell why the magnetic needle in a compass points toward the north star?" Here we notice several errors. In the first place, the magnetic and geographic poles of the earth are about 1000 miles apart from each other so that they cannot both be pointed toward the north. In the second place, even if the magnetic needle did point toward the north geographic pole, still it would not always point toward the same position in the sky. At the present time the north point in the sky is near the star Polaris. Due to precession, as we have previously pointed out, the north point is continually moving among the stars. About 4000 years ago the pole was near Alpha Draconis, which was then the pole star. Five thousand years hence the pole will pass within a few degrees of Alpha Cephei and in 12000 years within about 8° of Vega in the constellation Lyra. This will make a most glorious pole star.

Now let us turn our attention to the alleged opening in the starry heavens where there are supposed to be no stars existing. All the individual stars, visible either by the naked eye or through an ordinary telescope, belong to our immediate galaxy of stars which we call the Milky Way. Extensive investigation has shown that this group of stars, about thirty billion in number, are not arranged uniformly within a spherical space, as one might suppose, but are chiefly located in a space which has been described as being like a cart wheel. That is, it is a much flattened discoid, or an ellipsoid of revolution, the long axis of which lies in the plane of the Milky Way. The equatorial diameter of the galaxy is about 100,000 light-years; the polar diameter about 15,000 light-years.

The sun (and of course the solar system) is located slightly north of the galactic plane at a distance of about 30,000 light-years from the center of the galaxy. The stars within 2000 light-years of the sun form a local system or cluster of disklike form. The local cluster is but one of the local condensations of stars within the galaxy, of which there are probably numerous others. The galaxy is in rotation about an axis perpendicular to the plane of the Milky Way. The rotational velocities of the parts decrease and the rotational periods increase with the distance from the center, in accordance with Kepler's laws. At the distance of the sun, the rotational velocity is about 180 miles per second and the period of rotation about 200 million years.

Due to this structure of the galaxy, the number of stars within a given area of the sky decreases considerably as one goes from the plane of the Milky Way to the perpendicular to this plane. That is, there is a thinning out of the stars in both directions in the vicinity of the axis of rotation. However, since this thinning out of the stars is gradual and since the axis of rotation is inclined about 62° to the axis of the earth, it is hardly scientifically correct to speak of a rift or of a hole in the north.

However there is another matter that needs to be considered in connection with the alleged hole in the north. That is the presence of numerous dark nebulae in the sky. I quote now from Kennon: Astronomy, page 623; "Many patches occur in the richest parts of the Milky Way which appear either to be entirely devoid of stars, or to have star concentrations conspicuously less than those of the bordering regions. Earlier observers, including Sir William Herschel regarded these regions as vacant

vistas, or holes in the sky where one could look with unobstructed view into the depths of space. We now know that these dark, cloudlike areas are regions of diffuse, opaque material that are outlined by their obscuration of background stars and by delineating the foreground stars. Stars nearer than the nebulosity are, of course, projected upon it, while those more distant are obscured by the opaque clouds. Because of the wide areas of the sky obscured by many of these dark nebulosities, and because of the noticeable manner in which they diminish relative star concentrations, dark nebulae are rather inconspicuous to the unaided eye. As with the bright diffuse nebulae, their sharp outline and intricate detail become prominent only on properly exposed photographic plates."

Concerning the nature of these dark areas of the sky which have sometimes been called "holes", I quote again from Kennon: Astronomy page 626; "The existence of a system of radiating lanes, or tunnels, devoid of stars, extending entirely through the stellar domain is most improbable. Because of the random proper motion of the stars such a system of radiating lanes, or tunnels, devoid of stars, extending entirely through a large portion of the sky could not have existed in the past, nor could it continue to exist in the future. This adds to the improbability of its present existence. The presence of obscuring matter is confirmed by the distances and magnitudes of the foreground stars, as compared with the distances and magnitudes of stars near the borders of the dark areas. Dark areas occur infrequently except within the limits of the Milky Way, where we find the rich, distant star fields necessary to delineate the dark areas. There is no a priori reason for denying the existence of opaque nonluminous matter in the stellar system. Finally an inspection of the magnificent photographs of these areas by E. E. Barnard, Hubble, Duncan, Slipher, Bailey, Ross, Ritchey, Lampland, Wolf, and others leaves one with the inescapable conviction that no other interpretation than that of obscuring clouds is adequate to explain these truly marvelous photographs."

In spite of the abundance of evidence as to the nature of these dark areas, we still find statements like the following coming from some who wish to champion the Christian point of view. I quote again from Pettingill: "Is Heaven a Place?"; "And there is yet another point of tremendous interest in connection with this study. In the northern heavens, in the constellation of the Swan, the telescopic camera reveals an apparently empty space where there are no stars, though the region all around is thickly "peppered" with them. Astronomers differ as to the meaning of this phenomenon, some saying there is a "rift in the sky" and others that the apparent abyss is a dark nebulae. When doctors disagree we shall not attempt to decide, but it may be wondered if the Holy Spirit had any reference to this when he said of God through Job, 'He stretcheth out the north over the empty place, and hangeth the earth upon nothing'(26:7)."

With reference to this passage from Job, I believe that this is merely an example of Hebrew parallelism which shows that God by His omnipotence was able to firmly fix the earth in empty space. The northern part of the earth and sky was thought in ancient times to be the most important part and is here used as representing the whole world. Therefore I believe that Job 26:7 has no reference to the hole in the north.

Finally I would like to state a few of my convictions concerning the position of Heaven in space and the dwelling place of the most high God. I believe that the reason that people are interested in the possibility of a hole in the north is due to their misunderstanding of the nature of Heaven and of God. As Dr. Paul Bender pointed out in his paper "A Physicist's Glimpse of God" at our meeting last year, the God whom we worship and adore transcends, or is not limited by, the fundamental quantities which we study in Physics such as matter, space, and time. God is a

spirit and fundamentally we are spiritual beings. In the life after death we are to have spiritual bodies and will live in the spirit world where we too, will transcend matter, space, and time. Heaven then, as our eternal home, must be a spiritual place and it too will transcend physical quantities. So what need have we for a hole in the north or in any other direction. Space will no longer be a limitation to us so that we will then be in the presence of God continually.

Some speak of Heaven as though it were a particular location in space and of God as though he had his particular dwelling there. In other words, they picture the future life in terms of the concepts and conditions of this life. It is my firm conviction that such ideas are very much in error. We will live in the new life after death in an entirely different manner from the life we now live. The details of this life we do not know. Paul says "For now we see through a glass darkly; but then face to face: now I know in part; but then shall I know even as also I am known " (1 Cor. 13:13). The important thing for us now is to accept God's offer of full and complete salvation through belief on his Son as our Savior and Lord, and then to devote our lives in His service that the good news of a Savior may be made known to others.

* * * * *

BIOLOGY AND CHRISTIAN FUNDAMENTALS *

R. L. Mixter, Ph.D.
 Professor of Zoology
 Wheaton College, Wheaton, Ill.

Scientists are not forced by their science into any particular religion. Goldschmidt¹ has a man from Mars descend to inspect human beings and decide what significance there is to the differences in human structure. If this Martian should look at the religious beliefs of scientists he would find them as varied as in one of the graduate schools I attended. The head of the department was a Unitarian. The nature study teacher embraced the Catholic faith and the specialist on conservation appeared to have no religious beliefs at all. Across the campus a professor of engineering was a fundamentalist. Each of these men was acquainted with the same scientific method of induction and had the college library at his disposal. Science neither makes one religious nor keeps him from religion.

Therefore, one may examine the controversies which have occurred between science and religion unhindered by a "weight of opinion" held by scientists. The scientific method is the Scriptural method. "Prove all things; hold fast to that which is good."² The scientific method is that of observing the data, experimenting with phenomena, correlating the findings and drawing conclusions from them.

In spite of their use of the same method scientists may draw different conclusions. In the department of anatomy of a university in the city of Chicago, a famous anatomist and his pupil believed that the lining of the lung is a very thin membrane formed by cells touching one another, derived from the inner germ layer. In the same building were other anatomists who held that the blood capillaries were only partially covered by cells of the middle germ layer. Both of these groups of men had the same technique at their disposal but held to contrasting beliefs.

Outside their fields of research, scientists have opinions on many matters. Consider the variants in political ideas among university teachers. Not all of them adopt the same forms of recreation. In worship they bow before the God of the Christian or reverence eternal forces and matter. As scientists they try to leave the spiritual forces out of reckoning and yet in drawing their conclusions they speculate at length. A recent book on processes in evolution illustrates this. Simpson³ holds that only physical hypotheses should be used in scientific work but is willing to construct these guesses on data which he admits are inadequate. He does not rule out the spiritual in fields where the physical has so far failed to explain natural phenomena. Another famous biologist believes that "we are the intellectual and spiritual children of that most influential character in all history, Jesus Christ."⁴ He does not believe that the world was formed by chance. He cannot believe that the world and man are the products of pure accidents.

Because scientists have such differing beliefs in their own specialties and in every sphere of life we should not hesitate in our study of problems to follow the advice of one of the greatest of modern scientists whose brogue has him put a profound truth in this expression, "Vat iss de evidence?"

1. Goldschmidt, Material Basis of Evolution, 1940. p. 121
2. I Thessalonians 5:21
3. Simpson, Tempo and Mode in Evolution, 1944. p. 76
4. Conklin, Man, Real and Ideal, 1943, pp. 181, 190

*Used by courtesy Young People's Paper, published by American Sunday-School Union, copyrighted 1950.

In science a theory is satisfactory if it is consistent within itself and explains a group of phenomena. To me one of the chief Christian evidences is the ability of Christianity to meet the needs of man. If he needs comfort there is the 23rd Psalm. He is challenged by Hebrews 11. Some of his curiosity is satisfied by God's answers to Job. He receives conviction from the apostle Paul and derives his character from Christ Himself. The Christian Scriptures consistently meet the needs in all phases of man's personality.

Consider some of the facts of Biology which are in harmony with great doctrines of Scripture. First, organisms are machines. Carlson and Johnson call their textbook of physiology *THE MACHINERY OF THE BODY*. They say, "the working hypothesis of the biologist is that eventually the phenomenon of life will be explained in terms of physics and chemistry."⁵ Whether their ultimate goal will be realized is questionable, but many features of body activity are so explained.

In 1801 Paley argued that if one observes mechanical features in the body a machinist is needed to explain them. Where there is a contrivance like a watch there must have been a contriver. The more we find the body to be a machine, the more we are indicating there must have been a machinist greater than the body in order for the body to be produced. One of the best sellers in 1947 shows us that in order to get by chance combination one of the simple proteins of which the body is composed it would be necessary to have 1 followed by 243 zeros years. This is the beginning.⁶ Not only must the proteins be formed but in addition there must be enzymes to control them and cellular organization to give them stability. It may safely be stated that by the activities of pure chance there is no chance that life could have been spontaneously generated. Morrison has similarly argued in his book, *MAN DOES NOT STAND ALONE*, which was reviewed in the Reader's Digest of December 1946 under the title, "Seven Reasons Why a Scientist Believes in God."

We see then that the facts of biology are consistent with our first fundamental: there is a purposeful, intelligent Creator.

A second important fact in Biology is that organisms vary. Creatures are not confined to fixed types. The earliest human family has produced "all races that dwell under Heaven." These races are of one blood. The blood groups so important in blood transfusions are found in all races. If the phrase "of one blood" refers to germinal potencies it is very apt for any race may breed with any other and produce fertile offspring.

Paleontology also indicates that human beings have always been human beings. Franz Weidenreich stated that all fossil men belong to the genus *Homo*.⁷ Present day human beings are not all alike nor were all fossil men like present day human beings in all respects, but all are human in the essential characteristics of structure and behavior.

A similar situation exists in animals. Within a group of animals such as the family of horses there is indication that there has been some change from one form to another. It appears reasonable that the first horse may have had four toes on a front foot; a modern horse has only one. The first horse appeared to have teeth adapted to a browsing diet; today's horses are definitely of the grazing type.

5. Carlson and Johnson, *The Machinery of the Body*, 1941, p. 4

6. du Noffy, *Human Destiny*, Chap. 3.

7. Science, Vol. 104, No. 2709, 1946, p. 516

But all this change is within a limited group of animals. There is no fossil to close the gap between supposed ancestors of horses and the first horses. It is also true that there are "systematic deficiencies of record" between all comparable groups of animals and plants.⁸

The science of heredity adds the same type of conclusion. It is possible to make crosses within a species as in human crosses; between species as the mating of horse and ass; between genera like the crossing of the cabbage and radish and even between members of different families and orders as seen in the cross of killifish by the mackerel. But not one has ever seen the result of an attempted cross between such widely separated animals as the members of different classes such as reptiles and birds. As one of my university professors put it, "the answer to the origin of different classes of animals is outside of the field where genetics can make a contribution." We see, therefore, that although there has been some variation within the limits of the minor groupings of animals there has been no change demonstrated from one major group to another. This is in harmony with the Scriptural idea that God created the great sea monsters, the winged birds and the swarms of living creatures of the water after their kind and created man in His own image.

There is a third phenomenon of Biology which reflects on a miracle. It is called parthenogenesis, which means the production of an animal from only one parent. Gregory Pincus receives credit for much of the research in this field. His work was popularized a few years ago in Collier's by the title of an article on rabbit production, "No Father to Guide Them." Pincus operated upon female rabbits, by cooling stimulated the tubes down which the eggs were descending and let the animals come to term. A rabbit was born without a male parent.

One hesitates to compare this with the Virgin Birth which is the greatest of the miracles and yet the possibility of its occurrence may not seem so remote because of the demonstration that even mammals may have offspring without fathers.

Even miracles need not be inconceivable. A speaker in our chapel remarked "if the Bible said a tadpole swallowed Jonah, I would believe it." This appears to me to be asking one to believe something inconceivable, to accept something that cannot be imagined. By contrast a miracle is not an impossibility; it is the result of an Unusual Cause who does not distort nature to produce His results. Animal parthenogenesis suggests that the miracle of the Virgin Birth is within the realm of the possible. Thus a third great fundamental of our faith can no longer be questioned by biological laws. God has stepped into men's shoes in the person of Christ to reveal Himself to us and bring us back to Himself.

A final observation from Biology is this: all complex organisms die. The material of which they are composed disintegrates but we believe that the body of man encompasses a mind. The body came from an extremely minute speck of living material formed by a union of cells from each parent. Through this tiny bridge the hereditary characters of the parents are passed on to the offspring. Morrison said a thimble would hold all of the hereditary determiners necessary to produce all humanity now living. If the physical contribution to man's person demands so little material, it is possible that the entrance of mind into man requires no physical bridge. This was Paley's reasoning in his famous work on Natural Theology.

If so little substance is used in the early formation of a person, may the spirit not leave the body without the aid of any material? The body dies and decays,

8. Simpson, op. cit., p. 107

we describe the changes as we can observe them. What happens to the spirit we cannot see. Vernon Kellog remarked that we describe the before change conditions but the after change conditions may be the most important. To some biologists the only immortality is the passing on of our hereditary characteristics to succeeding generations, plus any contributions we have made to society.⁹ But if so small a speck of matter is necessary to maintain biological continuity, the Creator can provide spiritual continuity without any matter. Thus we conclude

"Dust thou art, to dust returnest
Was not spoken of the soul."

Students of nature should remain confident that the facts of their research will fit into the pattern the Bible outlined for the formation and preservation of living beings.

9. Conklin, op. cit., 1943, p. 179

* * * * *

Comments by Editor:

Paragraph 2. "The scientific method is the Scriptural method." This is very good, but would be more forceful if amplified and emphasized in a paragraph or two.

In regard to the miracle, it seems to me that the reflection on the miracle is worthy of some more reflection. The Virgin Birth is the Great miracle, and I doubt if we make much of a contribution by providing an analogous occurrence or a mechanism which is purely within the realm of the natural. Sooner or later in our Christian religion as it is centered around Christ, we must not only face but triumphantly champion the supernatural, the miraculous. With Machen and others it seems to me that the proper time is at the Virgin Birth rather than at the wedding-feast or the resurrection only.

* * * * *

CHRISTIAN TREATMENT OF THE MENTALLY ILL

M. J. Beukema, M. D., Pine Rest Sanitarium, Grand Rapids, Mich.

Presented at Third Annual Convention of A. S. A., Grand Rapids, Michigan, Sept. 3, 1948

It is indeed a privilege to address a group such as this; especially so when the topic deals with mental illness. I say this because I believe that the subject of mental sickness is far out on the periphery of the sphere of your interests as they are expressed in the purpose of your organization.

I hesitate somewhat in presenting a paper on the "Christian Treatment of the Mentally Ill" to a group of scientifically minded people for I am not at all qualified to give you a well organized system of thought on this topic nor do I know of the existence of any. However, your committee assured me that you would not criticize this paper for its failure to meet scientific standards.

There can be no doubt that today more than ever we are in need of a well formulated, authoritative Christian system of thought dealing with the entire field of psychiatry. I say this because the Psychoanalytic Theory has almost completely captivated both the public and also the professional mind with its intriguing terminology, its exploitation of the realm of sex and its development of the concept of a vast unexplored subconscious region in each individual mind. There is also need because of the increasing demand for a greater degree of Christian influence upon the world which also includes a greater demand for hospitalization of the mentally ill in Christian hospitals.

Now I believe, that for my purpose, I can divide the subject, "Christian Treatment of the Mentally Ill" into two parts. The one part has to do with the actual physical and social handling of the patient and the other deals more particularly with the use of psychiatric techniques. I certainly shall not attempt to give a detailed discussion of either part.

Under the first division, I refer to practical care that is given to the patient as objectified in providing comfortable living conditions, a congenial social environment, and adequate provision for bodily needs. When this care is guided by Christian motives it is of great value, especially for Christian patients because it provides for them an environment to which they are accustomed and in which they readily feel at home. This minimizes the degree of adjustment necessary for these sick people who so often go into a panic of uncertainty when faced with changes in their environment. It also encourages them to speak more freely of the religious doubts and fears that they may entertain for they realize that they are speaking to workers and fellow patients who understand the things about which they speak.

Another important element included under this part of Christian treatment is the spiritual atmosphere as it relates to prayer and Scripture reading at mealtime and also attendance at divine worship on Sunday. There are many patients who possess positive active Christian faith which needs exercise to remain alive just as much as the faith of the healthy person requires it.

One of you might at this time raise the question, what is the value of this treatment for the non-Christian patient--how does he respond to a Christian environment. Limited observation leads me to believe that such patients do have considerable difficulty to fit themselves comfortably into such an environment. On the other hand, they are sufficiently impressed by the gracious care they receive that the majority are eager to avail themselves of Christian care because of the patience and kindness that motivate the Christian worker in this field.

In order to obtain these conditions it is important to have a staff of nurses which is well informed religiously and which can recognize opportune moments to speak of these things.

Some of you may ask, is this treatment? Are not these conditions which we try to maintain in all the ordinary circumstances of our lives? That is indeed true but with this difference that to the mentally ill these ordinary values become extremely important because of the misery and agony they suffer. This may be compared somewhat to the state of mind of a soldier in front-line combat to whom a mess-kit of warm food and a pair of clean, dry socks mean almost as much as life itself. So too, the mentally ill cling to the ordinary small human kindnesses and search for words of comfort.

And now to bring out a few points relating to the other part of Christian treatment which I referred to before as the psychiatric approach which attempts to explain, to catalogue, and to treat mental disease. Allow me to repeat that it would be a great boon to the Christian world if some competent group of individuals would devote itself to formulating such a system contained in a volume or two which could be written in a style that all could understand. I am not able to give you a complete psychiatric treatise on the subject of Christian treatment nor would a paper of this size contain so large a subject.

I have chosen to center this part of the discussion around the questions, "Can we use the Christian religion as a cure for mental sickness?" And "What is the relationship, if any, between the Christian religion and psychiatric treatment of mental disease?" Many people of Christian faith give expressions to the feeling that those who become sick in mind, become so because they are lacking in faith. It is especially when speaking about those who are depressed that they raise the question, "Don't you think, Doctor, that if only they had a little more faith and assurance that they would snap out of it?" Or they will state, "I don't think that he's so very sick but just that he doesn't seem to have enough faith to believe that he is saved." Again others will ask, "Don't you think, Doctor, that if you can just straighten him out about his religious ideas that he will be alright?" These questions all suggest the thought that if only someone could make them believe enough in God and could give them assurance of salvation that then they would be cured. However, when one works with this type of patient one is soon impressed with their marked inability to rely on the promises and comforts of Scripture and one soon realizes that this condition represents something other than a lack of faith or insufficient knowledge of God's Word and is rather a diseased state of mind which produces a marked change in the patient's outlook on life affecting his spiritual as well as his mental vision. As a result, they apply to themselves only those portions of Scripture which condemn man for his sins and disobedience. The texts dealing with hope and promise for God's children they believe are true for others but not for themselves. In their own minds these sufferers have become irredeemable sinners and they magnify their former sins an hundred-fold. To them all of life is fraught with evil and in their anguish they try to escape it by suicide even though they live in dreadful fear of death. The depressed patient apparently suffers from a marked disturbance of his emotional balance so that the emotional scale is tipped entirely to the side of depression. As a result these people are unable to experience sensations of pleasure and no matter what direction they turn they see only gloominess which deepens their fearfulness and hopelessness. Or to present this thought somewhat differently, think of these people as first of all becoming sick with a depressed state of mind. Then because of this illness they develop a multitude of fears, feelings of worthlessness and a sense of aloneness with the conviction that they are wholly responsible for their condition and that they are absolutely without hope. Because of this diseased condition--this marked emotional disturbance which impairs intellect and judgment, one is unable to use Scripture or religious doctrines purely as psychiatric instruments to cure mental illness even though their gracious promises would seem capable of lifting the most despondent hearts.

In contrast, to this mistaken conception that Scripture may be used to cure the mentally ill stands the equally erroneous idea of the majority of non-Christian psychiatrists today who insist that religion is the outgrowth or remnant of the prehistoric fears of man's ancestors. They teach that religion with its manifold taboos on man's inner animalistic drives builds up tension in man which leads him to fear. Therefore they try to do away with religion by discrediting it to their patients. They will tolerate the beautiful ideals contained in religion but they oppose those portions that threaten punishment for man's failure to meet certain laws. The mistake in this premise is this, that it fails to recognize that the religious element of man's personality is something innate and not something acquired by contact with others nor from fear of his surroundings before the dawn of history. They ask the patient to forget, ignore and destroy an integral part of his personality. As a result of this, patients come to our hospital who have been greatly upset in mind due to the attempt of such a psychiatrist to pull even the last support away from them by advising them that they should set aside their religion which is nothing more than a terrifying myth. For many patients who have never experienced the power of the Christian religion this advice may not be traumatic, but certainly for those who have had that experience such advice would only increase their confusion and despair. This I believe will help you to see another reason why it is essential to have a Christian approach to psychiatry which does recognize man's religious nature as an elemental part of his personality.

Is there any relationship between the Christian religion and the psychiatric treatment of mental diseases? I have tried to bring out that we cannot use religion purely as a form of treatment nor can we discard it as some harmful acquired impedimenta. In general I may state that it should fulfill the same function in the life of a patient as it does in the life of a healthy minded Christian. However, there is a difference that for those who are sick, great care must be exercised in the degree to which they are advised and allowed to participate in religious activities. As I have intimated in this discussion the emotional disturbance of patients extends also into their religious life so that frequently it is necessary to advise them to do less reading of the Bible during these periods in which they are full of self-condemnation that they ordinarily would. On the other hand there are forms of mental disease in which the religious problems have not become so acute and in these cases directing the patient's thoughts to a more deeply religious outlook on life may be helpful toward his recovery.

This now brings to mind a question which is often asked, "Are there many people who become insane over religion?" This question as it is usually asked implies that there are people who become mentally ill because they have become too extensively or too deeply religious. I do not believe that it is correct to speak of mental illness developing out of excessive religiosity. It is to be looked upon, again, as a result or symptom of illness and not as a cause for mental illness. The reason that so many Christian people show the most marked disturbance in their religious feeling and thinking is no doubt chiefly due to the fact that the religious aspect of their life has been the most outstanding. I do not mean by this that it was outstanding in the sense that it was apparent to everyone, but that their religious training during early life made a lasting and deep impression on them so that they are conscious of the significance of religion for their temporal and external welfare. In this same way others are found in whom there is practically no religious distress but rather a distress of the moral sense which manifests itself particularly in the role which had the greatest meaning for them such as the family and marital relationships, business and social dealings or civic and humanitarian accomplishments. Therefore, it is not correct to speak of people developing mental disease because of religious, business or social activities.

I have tried in this paper to bring out that there is a definite need for a Christian approach in the treatment of patients with a Christian back-ground. Also I presented a few of the erroneous ideas prevalent with regard to religion and treatment and pointed out the need for judicious handling of both the patient and the Scriptures by workers trained to recognize the state of mind of patients, to handle the Scriptures and to advise the patients carefully according to their capacity to take in a well balanced diet of spiritual thoughts. In concluding I wish to have clearly before your minds that this discussion dealt primarily with mental illness as it appears in a depressed state. These statements would require modification for other forms of disease though in general they would be applicable to all types of diseases.

* * * * *

BEHAVIORISM AND PHILOSOPHICAL PSYCHOLOGY

Bernard Ramm, M. A., B. D.
 Professor of Apologetics, The Bible
 Institute of Los Angeles

The edifice of natural theology has been traditionally reared on the material provided by the study of the world, the soul, and God. Many scientists and educated people have decided that in the light of modern scientific investigation of the world we may bid adieu to God. This decision has come chiefly through the physical sciences that take the complete self-sufficiency of the universe as a working principle and convert it into a metaphysical dictum. Moderns have also said good-bye to the soul at the invitation of psychology, especially at the request of behaviorism. Any such effort must be taken with the utmost seriousness by students of historic Christianity for upon the existence of the soul so much depends. It is not only difficult but impossible to conceive of anything that could truly pass by the name of religious, let alone Christian, if there be no soul. The denial of the soul cuts the nerve of religion in two and any hopes of regrafting, e.g. in humanism, are doomed to failure. With the demise of the human spirit goes the two greatest values connected with it, *viz.*, ethics and immortality. If we are but advance animals then ethics can be exhaustively explained¹ by psychology, and as for immortality, obviously animals have no spirits to survive death. It is, then, quite evident that the denials of behaviorism make the Christian doctrine of the soul an impossibility.

The strange situation at this point is that psychology, "the science of the soul," has taken upon itself the task of denying its subject matter. However, psychologists say, at least on the surface, that the denial of the soul is not the result of philosophical bias, e.g., as contained in materialism, but is rather the necessary outcome of empirical investigation and scientific methodology. Bodies have been weighed before and after death to detect the weight of the soul. The few milligrams of weight lost at death has been determined to be the loss of air in the lungs. Bodies have been minutely dissected and brains have been finely sliced and no soul has been found. It is so concluded that there is no material evidence for a soul. In O'Toole, The Case Against Evolution, chapter II, of Part II, "The Origin of the Human Soul," it is quite clearly pointed out that we simply don't find a soul (a spiritual entity) by a methodology designed to catch only material data.

Upon the lack of material evidence for a soul has been imposed the lack of a soul on methodological grounds, namely, that we can ignore such an entity as the soul and still study psychology successfully. Therefore, what cannot be verified by anatomy or scientific method may be safely denied any existence. But when we take the soul out and bury it we bury along with it religion, conscience, ethics, and immortality, at least as they are so substantially defined in the Christian faith. With the burial of the soul is involved the burial of the entire Christian faith. So whether there be a soul or not in our bodies is of capital importance to every Christian.

The Relationship of Philosophy to Psychology

It is our contention that every special science is studied in an atmosphere as real as the air about us, and that atmosphere is the prevailing scientific mood of the day. The most cursory study of the history of science will reveal that science

1. This is exactly what the Logical Positivists do with ethics. Ethical statements to them are non-cognitive, hence non-factual. Their writers on ethics, e.g. Schlick, Feigl, Carnap, and Stevenson, claim that all ethical statements can be studied as either sentences in psychology or sociology. No normative sentences are permitted.

has its moods, tempers, and attitudes, that act as governors and criteria for what passes as scientific and as non-scientific. Just as we draw thousands of breaths and are unaware for the most part of one of the most central processes of life, so our scientists live in an atmosphere that colors and shades every judgment they make. Now this mood or atmosphere is not a bona fide part of science itself, but is some brand of philosophy whether clearly stated so or not. Hence it is of great import to know the precise relationship between the mood and the science, or between philosophy and psychology.

Psychology, as much as it tries to imitate physics, is a narrow, empirical study whereas philosophy is broad, general, and synoptic. A typical statement in psychology is: "This X is the result of that Y." A typical philosophical statement is: "Both X and Y are the results of Z," where Z stands for a more ultimate and foundational premise than either Y or X.

Psychology endeavors to keep the metaphysical questions out of the picture and works on an as-if basis whereas philosophy is the effort to draw the entire picture and takes the particular, in which psychology revels, as only one facet of a much larger whole.

Psychology and philosophy have problems that are exclusive to each other, and they also have problems that are inclusive of each other. Every philosopher by all means should have a good working knowledge of psychological theories and schools, and as much detailed knowledge as befits the problems he studies. Especially is this necessary for the epistemologists whose studies in the problem of knowledge need constant light from parallel studies in psychology. On the other hand the psychologist ought to forsake a strict "bread and butter" attitude toward his psychology and be somewhat concerned with the wider implications of his study. If he doesn't he becomes the typical narrow specialist who might be a genius in his particular speciality but very naive and foolish in treating the broader problems of meaning. In other words, both the philosopher and the psychologist ought to pay considerable attention to their common borderland, namely, philosophical psychology.

Relationship of Philosophical Psychology to Scientific Psychology

The purpose of psychology as a science is to investigate the thousands of different factors in human and animal psychology, and after investigation to classify the information attained by different categories and to formulate laws of varying degrees of generality. Psychology as science is not immediately concerned with philosophical problems. The problem of learning, of memory, of sensation, of visual judgment, are to be studied with as much scientific vigor and rigor as the physicist does his work. The problems of abnormal psychology are more complicated but the same scientific methodology should prevail.

But just as the physicist, if he ever lifts his eyes from his instruments or papers, must make some kind of cosmological judgment, so must the psychologist indicate the implications of his studies. The implications of the scientific study of psychology is the field of philosophical psychology. It asks one question that is stated two different ways: (1) What theory of man is necessary to make psychology possible? and (2) toward what theory of man does psychology point?

It will be noted in the first question that the theoretical foundations and the assumptive basis of psychology will become immediately apparent. The psychologist must be endowed with certain powers of discrimination, of intelligence, of purpose, of foresight, of moral integrity. No theory of psychology should be accepted that demands a higher interpretation of the experimenting psychologist, than the professed school of psychology permits—something we feel is true of behaviorism.

In the second question the exceeding complex state of affairs inside the human cranium becomes apparent. It is the Christian conviction that the answer to both questions will lead to some doctrine of an extra-organic soul.

The Sins of Behaviorism as Viewed from the Standpoint of Philosophical Psychology

We now come to grips with detailed parts of our problem. The first sin of behaviorism is its failure to realize that the psychologist works in a scientific atmosphere that colors so much of his work. Behaviorism adopts, for example, the mechanical (as opposed to the spiritual) theory of evolution and treats it with all the respect given to a metaphysical ultimate. He also adopts the incipient naturalism in the science of today as his metaphysical backdrop. Hence, by his adoption of naturalism and evolution--things that are the spirit of the times--he is already thoroughly enmeshed in metaphysical presuppositions how much he may seek to deny it. He will never come up with an answer to problems that are out of harmony with evolution or naturalism. That type of interpretation is verboten before he even digs into his daily experimentation.

The second sin of behaviorism is its unabashed goal of imitating physics, i.e. it seeks the same objectivity of physics no matter the price to be paid. One of the purposes of philosophical psychology is to lay bare exactly the nature of such professed objectivity and with Goethe declare that "any fact is in itself a theory" (Egon Brunswik, "Points of View," The Encyclopedia of Psychology, p. 527). A complete pan-objectivity is an impossibility no matter how tantalizing it is as a scientific goal. We need not let the factor of subjectivity in all human activity lead to subjective idealism, but on the other hand, of all sciences psychology is the most liable to subjectivity because, at least on the human level, it is the science of subjects. Hence, philosophical psychologists would object to the indiscriminate application of the objective methodology of physics to psychology. Physics can dispense with sympathy, and much of analogy, but psychology is impossible without sympathy and analogy. To understand physical objects we do not need to feel for them, or like them, or with them, although there are philosophers who would even insist upon it; and, further, I need not use anthropomorphic analogies in describing their activities, as for example, in such classic expressions as "nature abhors a vacuum," or, "each object seeks its place in nature." But in psychology we do sympathize with our objects of experiment, and we do make analogies between our experiences and those of our subjects. It has been claimed that human nature has been more adequately understood by the study of rats; but the study of rats is only possible by considering the rat a sort of mocked-down model of a human. It is closer to the actual scientific procedure to talk of the man-like rat, than of the rat-like man.

The third sin of behaviorism is its denial of consciousness. If vividness, repetition, familiarity, feelings of certainty, continuity, predictability, and the like, be taken as first hand categories for the reality of an entity, then consciousness is the first reality of all human knowledge.² Schopenhauer, many years ago, realized that causation had to be redefined at each level of reality, and indicated that mechanical causation in physics is replaced by sentience or stimulation in animals, and purpose or will in man. Consciousness is vividly and distinctly causative in each man's experience and the patent denial of it by behaviorism would be curious if not tragic. Not only is this denial of consciousness directly contrary

2. One of the greatest living philosophical psychologists is F. R. Tennant whose first volume of his Philosophical Theology, "The Soul and its Faculties," demonstrates, as far as we are concerned, the ultimacy and finality of consciousness.

to the most universal experience of all men, and of the most unimpeachable testimony of each individual man, but it is a metaphysical dogma. It is the dogma of pan-objectivism. Consciousness, as traditionally defined and commonly understood, is something very subjective. But subjectivity has been the ghost that has frightened materialism and naturalism for centuries and they have taken themselves to great extremes to rid themselves of it. Subjectivism has been one of the strong points of idealistic philosophy as it leads to the doctrine of a subject, i.e. a soul, and to the Great Subject--God, with due reference to those who think of God only as Object. If all the universe is to be trimmed down to fit the confines of physics then consciousness must go as it is peculiarly subjective. Watson brusquely rids himself of it. However, philosophical psychology steps in and indicates the nature of such a denial, its philosophical origins and implications, and the inconsistency of the position.

It is interesting and significant to note that the type of problem that previous philosophical psychologists were interested in, eg. Locke, Berkeley, Hume, Kant, Ward, Tennant, is no longer even on the curriculum of the average school of psychology. Psychology now appears as a strange subject--a study of subjects with no subject; a study of the souls with no soul; a study of the minds with no mind; a study of consciousness with no consciousness; a study of behavior with no subjectivity. If psychology has lost its soul, its consciousness, and its mind, it is one of the great tasks of philosophical psychology to restore the situation to normality and sanity.

The final sin of behaviorism is its denial of the importance of introspection. This is again in interest of its pan-objectivism, and its imitation of physics. But such a denial is not being accepted on all sides any more. Some have pointed out that inward introspection and outward inspection is all of the same cloth. Bertrand Russell in his latest work, Human Knowledge defends the validity of introspection (p. 45 ff). It is perhaps possible in medicine to do entirely without introspection, i.e. reports given by patients, as it actually is done in the case of animals and infants, but it would be a slow, laborious task. What a time doctors would have if all introspective data were left out of their books like "feelings of dizziness," or "dull pains," or, "a general feeling of nausea," or "spots before the eyes." An even more impossible situation would be found if this pan-objectivism were extended to psychiatry. However, even if the day comes when there is a completely objective method of detecting each symptom of a syndrome its ultimate roots in introspection could never be denied.

In conclusion, we believe that there would be few works so salutary to the defense of the Christian faith as a great volume on Philosophical psychology demonstrating from philosophical and psychological grounds the bi-partite nature of man.

3. A valuable study of this entire problem will be found in Morris, Six Theories of Mind. Cf. also James' famous essay, "Does Consciousness Exist?"