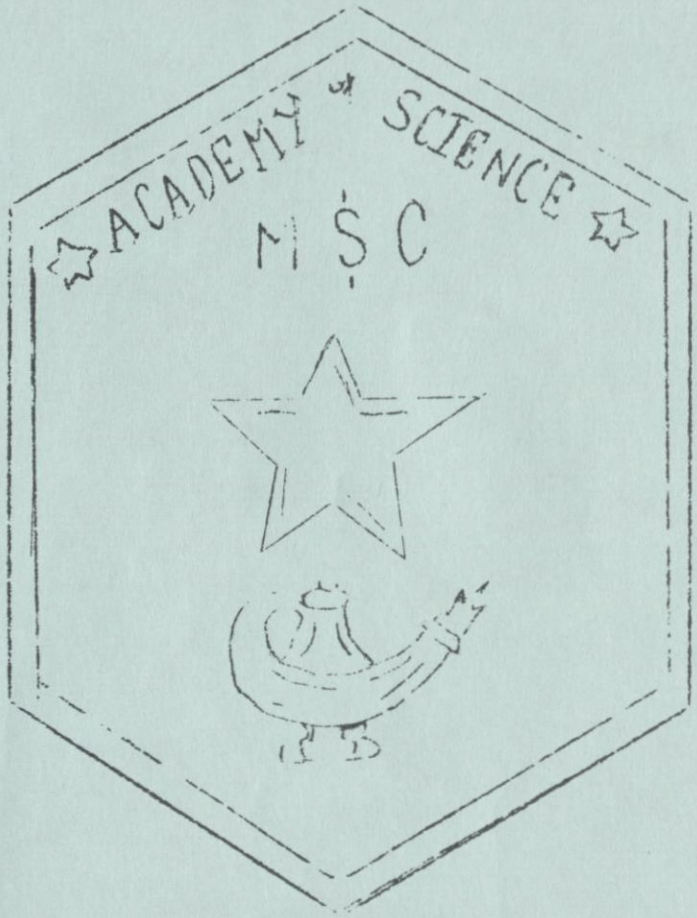
2-27-1964

The Hagen, volume 2, number 2 (1964)

Moorhead State College
Collegiate Academy of Science

Vol. II. No. II February 27, 1964

THE



HAGEN

MORHEAD STATE COLLEGE
COLLEGIATE ACADEMY OF SCIENCE

THE HAGEN

Editor in Chief.....Allan A. Brown
Associate Editor.....Rosemary Medin
Contributing Editor.....Lowry Craig
Publicity and Circulation.....Pat Watson
Promotion Director.....Dave Mork
Special Project Director.....Barry Tennenhouse
Academy Reporter.....Jane Bergford

GUEST EDITORIAL

> "Don't brood too much," she wrote to Helen, "on the superiority of the unseen to the seen . . .Our business is not to contrast the two, but to reconcile them." (E. M. Forster, Howard's End)

In his significant essay, The Two Cultures, English scientist and man of letters C.P. Snow tries to show the necessity of a reconciliation between the natural sciences and the liberal arts. The separation which has developed between these two major fields of human endeavor is artificial and threacherous; it is an indication of failure, of man's inability to effectively encompass his world.

Perhaps it is true that one of the tragedies of our time is that man has become two aware of his own limitations, and has consequently relinquished much of his independence to specialists. These specialists, although often aware of their own limitations, have convinced the "average" man of the 20th Century (whatever that is) that he is at best a sectioned being--incapable of integrating himself into the "whole" human being that he longs to be.

And so the decisions have been handed up to experts (What do I know about the nature of the atom?), and so the spiritual and moral issues of the day have become relevant only in other, distant worlds.

That which I seek, I know not. And that which I know not, I cannot seek. We as human beings have become content to exist in small worlds of particularized knowledge, often developing a peculiar sense of antipathy to foreign. and therefore "alien" subject matter. If I am an English major, I am expected to develop a healthy "in-group" attitude, a reverence for the purely thematic, and a distaste for the likes of Hagen Hall. If I am a chemistry major, I am not concerned with convocations on the subject of contemporary theatre, nor with much of MacLean Hall. Let me have facts and science! These are things with meaning!

Thus one side trysts with the other, neither really wanting to bridge a gap which they, themselves, have helped to construct, neither realized that the gap grows larger, and the voices from the other side harder to hear.

When it is too late to reach, when science has finally separated itself from purpose, when the liberal arts exist as last in a world absolved from the concrete --then we will feel the emptiness, the need for an entire experience. Because man has not tried to understand, because he has become satisfied with half-truths about himself and his world, he will have achieved total sterility at last

Man will pass the buck then, as now. Are the experts to blame? Is anyone to blame? Is he to blame? It will be one of the most colassal of all failures--a failure of the imagination to indulge itself. What if the world is larger than I think, after all? After all.

Margo Larson

****

LETTER TO THE EDITOR

In keeping in tune with the present influx of interest in evolution, genetics, eugenics and the like, I have done some outside reading on these topics. One must maintain his intellect in current issues to remain a part of the crowd around Hagen these days.

While enlightening myself on the population explosion, economic deterioration, population policies, eugenic selection, global evolutionary policy, and the eugenic approach to education, I suddenly realized that our world is evidently on the brink of disaster. Thank goodness we have eugenics and the global evolutionary policy to face up to our plight and lift us from the hands of fate.

Try this selection from Sir Julian Huxley's manuscript "Man and His Future" as your thought for the day.

Eugenic Selection Could Boost Intelligence

"The Improvement of human genetic quality by eugenic methods would take a great load of suffering and frustration off the shoulders of evolving humanity, and would much increase both enjoyment and efficiency.

"Let me give one example. The general level of genetic intelligence could theoretically be raised by eugenic selection; and even a slight rise in its average level would give a marked increase in the number of the outstandingly intelligent and capable people needed to run our increasingly complex societies. Thus a 1.5% increase in mean genetic intelligence quotient (IQ), from 100 to 101.5, would increase the production of those with an IQ of 160 and over by about 50%.

"How to implement a eugenic policy in practice is another matter. The effects of merely encouraging potentially well-endowed individuals to have more children, and vice versa, would be much too slow for modern psychosocial evolution. Eugenics will eventually have to have recourse to methods like multiple artificial insemination by preferred donors of high genetic quality, as Prof. Muller emphasized a quarter of a century ago. Such a policy will not be easy to execute. However, I confidently look forward to a time when eugenic improvement will become one of the major aims of mankind."

E. S. Gordon

****

DID YOU KNOW?

1. The first native born American dentist was Josiah Flagg. He practiced in Boston in 1782 at the age of eighteen.

2. If you had $100 and spent half each time, it would be impossible to spend it all.

3. Sir George Darwin's 19th Century idea that the moon broke off from the earth leaving a hole in the Pacific Ocean is now being reviewed.

****

PROFILE OF A PROFESSOR

Congratulations, Dr. Noice, for being named one of the outstanding professors in the upper midwest.

****

" Quotable Quotes "

" In this course we barely touch the tree-tops."

****

****

SCHOOLING IN FISHES

by Daniel R. Zinda

There are 15,000 to 17,000 or more species of fish; around 2,000 marine and 2,000 fresh water species of fish school. Some marine forms include herrings, mullets, bluefishes, mackerals, and tuna. An example of fresh water forms would be the common shiners.

Let us look at the possible advantages in schooling. One of the first would be that of protection. A predator may be scared off or confused by just the number of fish present at one time. Protection of young by larger older members of the group is not possible in fish schools. The tendency is for fish of relatively the same size to group together. One reason for this is that with increased size an increase in swimming speed is evidenced, so fish of similar size group.

Another adaptive advantage, that of hydronamics, argues that schooling provides a more efficient way to move through the water. The exertion of each fish may be lessened because it can utilize the turbulence produced by the surrounding fish, thereby increasing the overall efficiency of the entire group. This would enable the school of fish to possibly out-distance their enemy, conserving their energy for a faster, longer flight.

Another form of protection found in grouping of certain fishes is that of "collective mimicry." A particular species called Jenkinsia lamprotaenia, found in shallow waters in the Florida Keys area, group together so as to resemble a certain type of ray.

Another advantage of fish schooling would be the procuring of food. A number of fishes could find food easier than a solitary fish. Also, when food is found if there is enough, all may partake and none would be wasted, evidence the deadly Piranha.

Still another advantage of schooling has to do with the reproduction of the species. Usually when it is time to reproduce there is no courtship or mate selection. The fishes traveling in schools merely shed their eggs and sperm as they swim along. This particular feature enhances the probability of successful fertilization. In certain species the males may travel at the top of the school and the females near the lower part of the school.

Instinct does not explain what brings about the concerted action of fish in a school, although many animals exhibit clearly species-specific behavior. The life history of the individual has a profound role in molding the behavior of the mature animals, however typical of the species.

****

SCHOOLING IN FISHES (cont.)

Two particular schooling species of Menidia from the waters around Cape Cod were studied. Upon hatching these fish are no more than 5mm in length. It was observed that at about 10 mm in length these fry aggregated randomly but did not school. There was no sign of parallel orientation to one another. At 11 to 12mm in length, schooling could be observed for the first time. From observation one could say that schooling begins when the fry reach a certain length, even in laboratory conditions.

Schooling behavior can be described as developing initially from the interaction of two fry. As they grow older, the head-on approach to each other gives way to the head-to-tail approach: then the two fry tend to swim forward in parallel instead of fleeing from one another, and finally they are joined by increasing numbers of individuals in the formation of a school.

Fries reared in isolation will join a school. In fact, the shorter time the fry spend in isolation, the longer it takes them to form a school. This may possibly suggest that early experience with species mates may have set up some inhibitory process.

Visual attraction of one fish to another is necessary for schooling. A blinded fish cannot school. Color stimulus in some species is also important. Certain fishes school with their own species only if they are the same color. Dyed fishes do not school. In other species of fish which school in a very tight mass a tactile stimulus to schooling is suggested. The mutual pressure by individuals in the school pushing toward the center serves to maintain stability of the school. Anesthetized skin causes these fish to push violently as though to obtain the same degree of tactile stimulation. In addition, chemicals tend to change the formation of schools, and temperature changes cause schools to form or break up.

****

A T T E N T I O N

The science seminars are talks given by students and faculty of the science department during the quarter. These talks consist of facts and theories on which a student or a member of the faculty lecturesfor a half hour. An open discussion follows. These seminars are open to all students.

On March 2, 1964, at 5:00 in Hagen Hall Room 412,James Frisk will reveal some very interesting points about rabies. For example, did you know that in 1962 over 800 people died because of rabies, and in a certain group of the people, approximately half of them were given the proper treatment after being bitten by a rabied animal. On March 4, Richard Desaus will entertain the group with his talk of fish. Al Brown and David Bakken will round out th quarter on March 9 and 11 respectively with their talks.

****

****

"The Search for Behavioral Laws"
by Doug Medin

The basic assumption underlying psychological inquiry has been that behavior is lawful. The purpose then of psychology is to discover these behavioral laws. These behavioral laws should be similar in important aspects to the laws of physics. That is, behavioral laws should be both dual and symmetrical.

Much scientific endeavor in the area of psychology has been to search for cause and effect relationships. Ritchie (1954) has contended that this causal search or stimulus-response model has led psychologists astray. For example, the James-Lange theory claimed that emotions are a consequence of body activity. Modern psychological research has shown that indeed no causal relationship exists between body activity and emotional state and that one merely accompanys the other. It seems unlikely that the S-R model can ever yield laws which are dual and symmetrical. The weakness in the S-R model lies in its lack of symmetry. Let us take for example a hypothetical behavioral law $R = D + H - I$ (where D is the Drive, H the Habit strength, I the Inhibition, and R the Response). Psychologists can find R with given values of D, H and I, but fail to find D, H, and I with given values of R. The constant does not always stay the same when the conditions are unchanged as in the laws of Physics.

As an alternative to the S-R model Ritchie suggests that psychologists study the functional relationships between two variables. Functional relationships describe a uniform relationship between two and only two variables. For example $X = Y$ or $PV = K$ where K is constant. In this manner psychologists can write symmetrical behavioral laws since no temporal sequence is implied as in S-R concepts. As the time interval between cause and effect shortens, we approach the functional relationships found in the laws of physics. If psychologists are to ultimately write behavior laws they must abandon the non-symmetrical S-R model and adopt a functional relationship model where some common factor is sought to give these laws duality as well as symmetry. Ritchie's adumbrations if not empirically based, have no little heuristic value.

****

ACADEMY NEWS
by Jane Bergford

A general meeting of the Academy was held on January 29, President Lowry Craig presiding. Due to the lack of a quorum, very little business was discussed. The evening's program consisted of a talk on "Determination of the Molecular Weight of Protein" by Dr. Klosterman, chairman of the biochem department of NDSU.

I Am a Doctor, the first in a series of films from the American Medical Association was shown on Thursday, February 13. The remaining five will be shown on the next five Thursdays.

Congratulations to Floyd Campbell, Harold Schuckard, and Dan Zinda for their election to Who's Who.

The group research project ran tests on samples taken from the sugar plant lagoon. They are now running a series of tests on the Glyndon reservoir for biological life and its tolerance.

All members are urged to attend the Academy meeting on March 3rd. A voting majority is needed to approve a crest, and changes in the executive and constitution. Following the meeting, a forum will be held in which Dr. Smurr of the history department will present a paper, "Laws of History and Laws of Science."

****

****

EDITION SPECIAL

"Limits of Science"

Thoughts on the limits of science have no doubt been expressed ever since man recognized the power of quantitative experimentation. A serious question arises in any discussion of the limits of science: what branch of knowledge is to be used as the guide for delineating the limits of science? Some basis must be used because we have no occult power to prophesy out of thin air what the ultimate limits will be. One field that has gained impetus recently is called the philosophy of science or scientific philosophy. A discussion of the limits of science would properly fall within the scope of this discipline. However, the question still remains: what does the philosophy of science use as the guide in setting the limits of science? The answer seems to be that, essentially, science has to act as its own guide in these matters, drawing on the rigor of logic and some of the conclusions and dilemmas of classical philosophy whenever they seem fruitful.

If current science is to be used to prophesy the ultimate limits of future science, then we see we are necessarily in a weak position. The correctness of the prophecies will depend largely on the correctness of current scientific theories. And unfortunately, the scientific method for evolving and checking theories is such that one can never prove the absolute correctness of the theory. The reason for this comes from the fact that the fundamental theories always arise by a generalization from a rather restricted compilation of empirical results. This process of generalization cannot be done in a unique way, and one never knows for certain whether or not some other theory arising from a different chain of inductive reasoning may have equal or better claim to correctness over the currently accepted one.

A topic that would perhaps fit in naturally here is the problem of where do the mysteries of life fit into the limits of science. It seems very likely that all basic physical laws needed to account for living processes are already known. At the risk of oversimplification one might say that the business of the molecular biologist is trying to find out how a living machine works. A particularly interesting article along these lines has been written by Michael Polanyi in the October, 1962 issue of Reviews of Modern Physics. Polanyi points out that we may need to know more than the mathematical laws of physics and chemistry to completely describe the living machine in much the same way that an engineer would find it fruitless to try to describe the detailed design of an automobile in terms of mathematical physics alone.

It has been stated by some that the limits of science (particularly physics) are given by the basic theories themselves. Statements about what nature cannot do can actually be made the foundation for most of physics. Postulates specifying what is impossible of accomplishment have been called "Postulates of Impotence".

****

All of the results of classical electrodynamics can be obtained from the following two postulates of impotence:

1. It is impossible to set up an electric field in any region of space enclosed by a conductor by charging the conductor.
2. It is impossible to detect a uniform translatory motion of an entire system by measurements taking place wholly inside the system.

The general theory of relativity has its two postulates of impotence as well:

1. It is impossible to send a signal faster than the speed of light.
2. It is impossible from measurements made entirely inside a room to distinguish between whether the room is being uniformly accelerated or is in a gravitational field.

A large part of quantum mechanics can be presented in the statements that it is impossible to tell one electron from another and that it is impossible even with the most ideal apparatus to determine the speed and position of an object simultaneously with unlimited precision.

All of thermodynamics can be formulated in terms of three postulates of impotence:

1. The law of conservation of energy which can be expressed by claiming the impossibility of constructing a perpetual motion machine.
2. It is impossible to pump heat energy from a lower to a higher temperature region without doing some work to make the process proceed.
3. It is impossible to reach absolute zero of temperature.

It certainly seems as though all these laws of impotence demonstrate the limits of science; however this idea is false because the postulates of impotence only give descriptions of the behavior of nature and have no bearing on the limits of science.

Jay Evett
Department of Natural Science