inhibitions and becomes capable of free and unlimited growth.

If this view is right, then neoplasms, and especially malignant neoplasms, must be regarded as tissues which in response to a number of different irritants react by showing a release from the normal growth gradients which ordinarily regulate body structure. The real problem of cancer then becomes a study of these gradients, and from the therapeutic standpoint their reestablishment when once lost or the prevention of their loss. The present line of study, largely devoted to the determination of the character of these irritants, will of course always be a matter of importance, but of secondary rather than primary grade.

Some of our therapeutic measures in the control of cancer are already directed to the former end. The use of radium and the X-ray, for instance, is essentially an effort to accomplish two things which tend toward a reestablishment of lost gradient—the inhibition through destruction—at best usually partial—of the unrestricted cell division, plus the stimulation of connective tissue growth to the point where this more nearly equals the proliferation rate of the tumor cells.

It would seem no longer correct to speculate as to the "cause of cancer." We would seem to have reached the point where it is necessary to recognize that there are a number of distinct causes, related only in the sense that they produce a common effect. Neoplasms then constitute an entity in the same sense that acute inflammation is an entity—a single type of reaction brought about by a variety of causes—and like that, an inflammatory process in that it is a reaction to injury.

To prove this experimentally aside from the finding of a still greater number of causative factors will be a difficult matter. One possible means would lie in the establishment of immunity, as to *B. tumefaciens,* and the demonstration that this immunity did not protect against other causes of cancer, as for instance, coal tar.

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THE CUTICULA OF NEMATODES

IN an abstract published in the December, 1927, number of *The Journal of Parasitology,* on "The Cuticula of the Neamathelminthes," Justus F. Mueller states that he has found the cuticula of Gordius and Macracanthoyhynchus to be chemically homogeneous and that of Ascaris to be separated into two chemically distinct substances. All four substances are proteins of albuminoid character, none related to chitin. The three substances found in Ascaris and Gordius are fairly similar, while that of the acanthocephala is different. He states that he does not agree with me (*Camallanus americanus,* nov. spec. *Trans. Amer. Microsc. Soc.,* 1919, 38: 49–170) in calling the substance in Ascaris cornein, and states I was in error because of incorrectly translating Reichard.

Since the abstract does not call attention to the point I was attempting to make in my study, it would leave in the minds of those not familiar with the facts an incorrect idea. In the first place my error, for which I apologize, was due to my misconstruing the force of the subtitles of Reichard's paper; I thought at that time the heading "Cornein" was intended to refer to the cuticula of worms and my error was not one of translation. The whole purpose of my contribution was to show that the cuticula of nematodes was not chitin but was a protein of albuminoid nature. In this I am glad to see that Mueller agrees. Cornein is also an albuminoid. I had been taught and had read in many commonly used texts, in the article written on nematoda for the Encyclopedia Britannica by Shipley and Beddard and in articles on nematodes by such men as Ransom, Hall and Ward that the cuticula of nematodes was chitinous. Indeed some zoologists, as proof of the supposed relation of worms and arthropods, stated that both had chitinous covering. As pointed out in my paper, Leuckart was undoubtedly responsible for the misconception, although he knew that the two coverings were fundamentally different. In spite of the fact that men as far back as Lassaigne (1843) pointed out the difference in the cuticula of Ascaris and the chitin described by Odier, authors still referred to the covering of nematodes as chitinous. My study was undertaken to show conclusively the differences in the structures. I concluded that the cuticula of nematodes was composed of a protein of the albuminoid type, closely related to connective and supportive tissue and unrelated to chitin. In this I carried on further the work of Reichard and agreed with him in his work, but incorrectly stated that he called the substance cornein.

Mueller states that he has for the first time correctly analyzed this material, basing his statement on the fact that he analyzed the two parts separately, unless he means to imply that the actual analysis of all other authors was erroneous. The former statement depends on the point of view. By his own statement the two parts form the cuticula; therefore to analyze them together would certainly constitute a true analysis of the cuticula, just as, in analyzing the liver or spleen, one does not separate them into their many components. Reichard called attention to certain physical and chemical differences in two layers of Ascaris and I described four layers for Camallanus. Others have subdivided the cuticula of nematodes into

different layers, and in partly dried material one is often able to strip off several layers. Mueller's statement that the cuticular layers of Ascaris are "fairly similar" leads me to hope that his analysis may be regarded as in a general way confirming my own.

It is interesting to note that Ward states in his chapter on Parasitic Worms (Ward and Whipple, "Fresh Water Biology") in discussing the cuticula of nematodes that "it has been correctly designated as cornein by Reichard." Since no reference to my incorrect statement is made in this text book it may be inferred that Ward also was misled by the subtitles.

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AN UNUSUAL ATMOSPHERIC PHENOMENON

ON the morning of December 14 a rather unusual atmospheric phenomenon, the so-called circumzenithal arc, was observed at Brunswick, Me. It had the form of a bright rainbow-like arc about 90 degrees in extent with its center of curvature approximately at the zenith. The colors were much more clearly defined than in the ordinary rainbow, the red being at the outer edge of the arc and the violet at the inner. The arc extended in azimuth roughly from west to south. When the phenomenon first appeared the sun was at an altitude of some 20 degrees, and the edge of the arc at about 70 degrees. The arc remained visible for about half an hour. The weather at the time was clearing, and low lying fog clouds moving from north to south partially obscured the sun although blue sky was visible near the zenith. The surface temperature was slightly above freezing.

The phenomenon just described while rare is not unknown. It may be explained by the refraction of the sun's rays in passing through columnar snow crystals with tabular caps, the crystals acting as right prisms. A detailed explanation of the circumzenithal arc is given by Humphreys in "Physics of the Air," p. 511. The striking feature of this particular occurrence of it was its duration. As generally observed it has lasted only about five minutes, while in this instance it was distinctly visible for a full half hour.

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PSYCHO-ENDOCRINOLOGY

NEW words are sometimes as important events in history of science as new discoveries. For the word means the crystallization of a new concept. And the crystallization of a new concept means the attainment of one of the ideals of science: the correlation of the relationships of hitherto unrelated observations and findings. Such new concepts are valuable not only for classification of the activities of the worker in science in the past, but also for orientation towards the problems and methods of the future.

Accumulating information during the past fifty years has pointed to an importance of the endocrine glands for the problems of the science of psychology. Whether that science be looked upon as the study and control of consciousness or whether it be looked upon as the study and control of the behavior of an organism as a whole reacting to an environment makes no difference. From either viewpoint, evidence has accumulated that the endocrine glands, modifying conditions in the organism in general and in the nervous system in particular, are of the utmost significance for the data of psychology.

It is time I think an attempt was made to collect under the rubric of a single name the results of various individual investigations in the fields of psychology, biochemistry and medicine, where they will be collectively available to the research worker. I propose the word "psycho-endocrinology" as the name for that branch of science which deals with the relation of the endocrine glands to mental activities and processes, as well as to behavior, including the individual characteristics in health and disease, summarized in the term personality.

LOUIS BERMAN

QUOTATIONS

STATE ACADEMIES OF SCIENCE

THE American Association for the Advancement of Science has now in affiliation with it the academies of science of twenty-two states. As an organization this association and its affiliated organizations are not much given to talking of themselves. The report of the activities and progress of the state academies as told in an address of the president of the New Hampshire Academy and published in SCIENCE would indicate that they have a position of importance in creating an interest in scientific achievements and disseminating valuable scientific information. The name of the association might suggest an exclusive gathering of college professors and scientists. While it has in its own membership and that of the affiliated organizations men of learning and attainments in scientific research at the same time it has members who may never have spent an hour in a scientific laboratory, whose part in the organization is that of individuals of the ever-increasing number in this country who are interested in science and who find in one or more of its branches, as the report says, an avocation or a hobby distinct from their ordinary life routine.