

specimens (*A. m. krausei*), the head width and the HW/SV ratio are usually less than the value obtained from either of the two formulas, while in western specimens (*A. m. macrodactylum*) the head width and the HW/SV ratio tend to be higher than the formula values. The formulas produce about the same degree of satisfactory separation of the two populations. In my original paper (*op. cit.*) I published a graph based on the first formula used in conjunction with 86 specimens equally divided between the eastern and western populations. That the formula is a satisfactory dichotomous device, and that the two populations have significantly different head widths when strictly comparable specimens are examined, is reflected in the fact that 61 out of the 86 specimens used (= 71 per cent) in preparing the graph are correctly separated by the curve computed from the formula. When this result is tested by chi-square to determine if it could have been fortuitous or resulted from a significant association between head width size and geographic origin, a chi-square value of 17.7 is obtained, indicating a highly significant association between the variable (head width) and geographic origin.

More recently, Joshua L. Baily, Jr., has reviewed my study of *Ambystoma macrodactylum*, with especial attention to the problem of the significance of the differences existing between the head widths of eastern and western specimens. Mr. Baily's paper includes an excellent discussion of some properties of the arithmetic mean, and of another average, the trigonometric mean, but does not appear to contribute in any way to the problem at hand. Baily states in the beginning of his paper (1948, p. 171) that he is inclined to question whether my material adequately demonstrates a real difference in head width in the salamanders under discussion, but in the conclusion of his paper (p. 174) Baily says that confirmation is given to my conclusion that Idaho specimens have narrower heads than do specimens from Oregon and Washington, subject to certain limitations.

Baily has attacked the problem of determining whether a significant head width difference exists between these two populations through the medium of comparing certain

means, and the differences between these means. His results show that there exists a significant difference between the means of the HW/SV ratios of the two populations, whether the arithmetic mean or the trigonometric mean is used. However, although Baily's results confirm my original contention, his use of means to investigate the problem is open to serious question. When organisms display a strong ontogenetic variation in certain structural characters, as do these salamanders, the comparison of means based on these characters and predicated on random samples seems to me to be essentially meaningless. To have any true biological and statistical significance, such means must properly be based on equal numbers of specimens of each of the two populations or samples, for any given size class. Baily drew his data from the graph published in my original paper (*loc. cit.*), but it will be noted that the 43 Idaho specimens used in preparing this graph range from 41 to 59 mm in snout-vent length, while the 43 Oregon and Washington specimens vary from 40 to 68 mm, with not less than 10 out of the 43 western specimens being 60 mm⁺ in length. As I have pointed out, the tendency in these ambystomids is to develop a proportionately narrower head as the snout-vent length increases. Hence, with 23 per cent of the Oregon-Washington sample of greater length than any available Idaho specimens (of those used in preparing the graph), means of the HW/SV ratios of these two samples would be biased toward a relatively lower figure for the western (Oregon-Washington) specimens than that obtained for the eastern (Idaho) specimens, and hence the difference between these means would tend to diminish. That the difference between these means is still significant, as Baily found, is strong confirmation of the real difference in head width in these two populations. Had there been Idaho specimens in the 60-68 mm range, the difference would probably have been even greater, as it would likewise have been if the Oregon-Washington specimens in the 60-80 mm range had been deleted from Baily's computations; with strictly comparable numbers of specimens from each of the two samples available for each size class, the

difference would have been still greater. In any event, a far better procedure for the determination of the significance of the difference in head width in these two populations would be to use a test such as the chi-square, or the standard error of the difference between the regression coefficients (of the head width—snout-vent regression of each sample).

In his conclusion, Baily states that my original finding respecting the difference in head width is confirmed "subject to limitations hereinbefore noted." The only possibly pertinent limitation Baily has noted, is that in my original paper I stated that the populations representing the races *krausei* and *macrodactylum* are homogeneous *intra se*, whereas Baily says that despite significant differences in the head widths of the two samples there may be local races of *macrodactylum* which do not differ from the Idaho (*krausei*) population in the same manner as the samples from Oregon and Washington which were used in this study. This is of course a distinct possibility; however, in the course of my investigation numerous intrapopulation comparisons of various criteria were made, and in no instance did the results suggest any other conclusion but that *krausei* and *macrodactylum* are composed of homogeneous populations, as defined in my paper.

In closing his paper, Baily points out what appears to be a *lapsus* on my part, in that the formula used in my graph is amenable to simplification, and can be reduced to—

$$\frac{6 \log (SV)}{SV}$$

However, this is the formula for a ratio, whereas the formula used in my graph is that of a simple equation. Baily goes on to state that my formula produces a "standard" head width—which is correct so far as the formula used for the graph is concerned. But obviously, in presenting his apparently simpler formula, he has reference to the second of my two formulas given above, which yields a "standard" *HW/SV* ratio, not a "standard" head width. In any event,

Baily's formula produces an arithmetic result completely incompatible with either of my formulas, and the value obtained has no pertinency in the present problem.

Despite Baily's contentions to the contrary, the apparently straight line in my graph is a portion of a curve, and this curve passes through the common origin of both the *HW* and *SV* scales, if the graph is expanded so that both the abscissa and ordinate scales start at zero values. This curve is not asymptotic, as Baily maintains, since a zero value of *SV* will produce a zero formula value, thus causing the curve to pass through the common origin of both scales of the graph.

SUMMARY

1. The problem of the dichotomous utilization of an ontogenetic variable, specifically the *HW/SV* ratio in *Ambystoma macrodactylum*, is discussed. The significant difference in the head widths of specimens of comparable snout-vent lengths of *A. m. krausei* and *A. m. macrodactylum* is reaffirmed, as is also the usefulness of the formula $(2 \log SV)^2 - (\log SV)^2$ in defining dichotomously the head widths of specimens of any snout-vent length.

2. Joshua L. Baily's use of various means to analyse the differences in head widths of *A. m. krausei* and *A. m. macrodactylum* is discussed, and the limitations involved in the use of means predicated on ontogenetically-variable ratios are pointed out.

3. Baily's contention of a *lapsus* in my original paper is refuted, his confusion of two formulas is pointed out, and it is noted that my curve is non-asymptotic, and that the formula from which it is derived is not amenable to further simplification.

LITERATURE CITED

- BAILY, JOSHUA L., JR. *Supplementary observations on the geographic variation of Ambystoma macrodactylum*. *Herpetologica* 4: 171-174. 1948.
- MITTLEMAN, M. B. *American Caudata: II, Geographic variation in Ambystoma macrodactylum*. *Herpetologica* 4: 81-95, fig. 1. 1948.

PROCEEDINGS OF THE ACADEMY

421ST MEETING OF BOARD OF MANAGERS

The 421st meeting of the Board of Managers, held in the Cosmos Club, October 18, 1948, was called to order at 8:05 P.M. by the President, Dr. F. D. ROSSINI. Others present were: W. L. SCHMITT, F. G. BRICKWEDDE, W. W. DIEHL, F. M. DEFANDORF, W. N. FENTON, WALTER RAMBERG, T. DALE STEWART, C. F. W. MUESEBECK, W. W. RUBEY, F. O. COE, M. A. MASON, H. G. DORSEY, C. L. GAZIN, and, by invitation, R. J. SEEGER, ALAN STONE, and FRANK THONE.

The chairman of the Committee on Meetings, Dr. RAYMOND J. SEEGER, announced that Dr. TRYTTEN, of the National Research Council, had been secured as speaker for the October meeting of the Academy and that he would talk on *Scientific personnel problems of today*. He also announced that Dr. BACHER, of the Atomic Energy Commission, would speak on atomic-energy research at the November meeting.

Five persons were elected to resident membership and one to nonresident membership.

The chairman of the Special Committee on the Encouragement of Science Talent in the schools of the Washington area, Dr. MARTIN A. MASON, presented the following report:

The Special Committee on Encouragement of Science Talent in the schools of the Washington area, appointed June 9, 1948, has the pleasure of presenting herewith its report.

The Committee has interpreted its function to be the development of firm recommendations for action in the immediate or near future but not necessarily to consider the ways and means by which action can be taken. Further, it has been assumed that the schools referred to are public, private, or sectarian high schools, colleges and universities within the boundaries of the District of Columbia.

It is the opinion of the committee that recognition of science talent is a necessary first part of any program of science talent encouragement. The limited resources, both financial and human, of the Academy impose the necessity of expending those resources only for the encouragement and fostering of a certain demonstrated minimum science talent rather than in a broad program looking toward recognition and development of all latent science talent in the area. The committee states its opinion that recognition of talent should occur during the early years of high school, with encouragement of the recognized talent reaching a maximum of effort in the high school-college transition years, continuing at high level

through the sophomore college year, then decreasing to a minimum at the baccalaureate stage. This system would provide for discovery of talent at the earliest practicable stage of its development and insure maximum encouragement at the most critical period of the potential scientist's career. The committee has considered the problems involved in the discovery and recognition of scientific talent.

It has been the experience of others who have engaged the problem of recognition of talent that the use of tests, competitive exhibitions of the products of talent, and similar means of selection is difficult, requires elaborate staging with an accompanying large expenditure of time and effort, and is quite expensive. The committee doubts that the Academy would desire or is in a position to undertake an independent talent search of the required magnitude. As an alternative the desirability of affiliating with the National Science Talent Search, sponsored by the Westinghouse Electric Corporation, has been examined. The committee is assured that such an affiliation would be welcomed and that no responsibility or obligations other than those desired by the Academy would be assumed. The Academy would have made available to it the results of the ratings of local area contestants in the national competition for use in the selection of recipients of Academy recognition and encouragement.

The Academy now participates in the annual Washington Science Fair which encompasses the entire high school population of the area. Expanded participation in the Science Fair would provide more opportunity to recognize and encourage science talent in the early high school years.

It is the opinion of the committee that the problems of recognition of science talent in the Washington area can be solved by affiliation with the National Science Talent Search and expanded participation in the Washington Science Fair.

Encouragement of science talent once recognized may take many forms. The committee believes that, in any case, its principal objective should be to foster, guide and support the development of scientific talent to a point from which the individual with the talent can continue "on his own steam".

Encouragement may be physical, in the sense of providing ways and means for further training or education in scientific disciplines; such as, awards of scholarships, fellowships or other financial subsidies, or provision of opportunities to work in research institutions. It may be mental, in the sense of providing intellectual stimulation; for example, by providing opportunities for association in an intimate manner with competent, mature scientists in various fields. Lastly, it

may be psychological, in the sense of influencing development indirectly; for example, by the award of certificates or minor honors to set apart individuals on a basis of achievement. Obviously these forms may, and probably should, be combined. The committee believes the association of minds to be the most desirable fostering method. It recognizes the idealistic aspect of that point of view, although the method has been employed frequently, particularly when exceptionally talented young people have spontaneously made their own contacts. The factor of spontaneity is of utmost importance to the method's success, since the contact is likely to fail of achievement if the student or matured scientist feels a loss of independence. Recognition of the human aspects of the problem appears to lead to the necessity of including other forms of encouragement. In this connection it is the opinion of the committee that the use of financial rewards should be considered as the least desirable form of encouragement.

Consideration also has been given to the recent report of a Special Committee on a Junior Washington Academy of Sciences, published in the *JOURNAL* 38:(6): 220-222, June 15, 1948, which outlines the value of a Junior Academy in the encouragement of science talent as well as the functions of such a group. It is the opinion of the committee that a Junior Academy, governed by a small committee of senior Academy members, would provide an eminently suited mechanism for encouraging young science talent in consonance with the principles discussed above.

The question of Academy awards for achievement has been considered in conjunction with participation in the National Science Talent Search. If the Academy is to participate in the Search it must be prepared to recognize outstanding local talent in some material fashion. The committee believes that public award of a certificate of merit at a meeting of the Academy would constitute suitable recognition, and would be consonant with the resources of the Academy.

The committee therefore recommends:

1. Affiliation with the National Science Talent Search as a local sponsor, at the earliest practicable moment; and public award of Certificates of Merit to selected outstanding local participants in the National Science Talent Search.
2. That the Academy consider the possibility of expanded participation in the Washington Science Fair.
3. Formulation of a detailed plan for a Washington Junior Academy of Sciences, including a constitution, bylaws, and budget.

4. Appointment of a Standing Committee on Encouragement of Science Talent to implement the above recommendations; this committee to consist of six members, of which two are to be appointed annually for three year terms.

MARTIN A. MASON, *Chairman.*

A. T. MCPHERSON

B. D. VANEVERA

FRANK THONE

The Board of Managers accepted the report of the above committee and referred the matter of creating a Standing Committee on Encouragement of Science Talent to the Committee on Bylaws for definition and phrasing preparatory to its incorporation into the Standing Rules.

The chairman of the Committee on the Index to the *JOURNAL*, Dr. W. N. FENTON, presented an informal progress report. He informed the Board that the matter of indexing had been taken up with Miss MARY A. BRADLEY, Technical Editor, Bureau of Entomology and Plant Quarantine, who agreed to index a sample volume of the *JOURNAL* for the purpose of establishing standards and determining costs, reporting her findings to Dr. FENTON and Mr. OEHSER.

L. L. HARTER was transferred to the retired list of members as of December 31, 1944.

The Secretary announced the death of LOUIS COHEN, of Arlington, Va., on September 28, 1948; and of H. T. HERRICK, formerly of the Bureau of Chemistry and Soils, on October 7, 1948.

The Academy's representative on the council of the American Association for the Advancement of Science, Dr. FRANK THONE, gave an informal report on the Centennial Meeting of the A. A. A. S., which took place in Washington during the middle week of September. He pointed out that he had secured the nomination of Dr. CONDON, an Academy member and Director of the Bureau of Standards, for presidency of the A. A. A. S. for 1949. He also called attention to a meeting of the State academies of science and a paper which he presented on Federal aid to science. It was announced that the 1949 annual meeting would be held in New York during the Christmas week.

The meeting was adjourned at 9:10 P.M.

C. LEWIS GAZIN, *Secretary.*



Mittleman, M. B. 1949. "The validity of relative head width in defining the races of *Ambystoma macrodactylum*." *Journal of the Washington Academy of Sciences* 39, 43–46.

View This Item Online: <https://www.biodiversitylibrary.org/item/122713>

Permalink: <https://www.biodiversitylibrary.org/partpdf/101142>

Holding Institution

Smithsonian Libraries and Archives

Sponsored by

Biodiversity Heritage Library

Copyright & Reuse

Copyright Status: Permission to digitize granted by the rights holder

Rights: <https://www.biodiversitylibrary.org/permissions/>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.