made in distilled water were allowed to act on 1% sucrose solution at 27° C. After 5 hr, Fehling's test was applied to the solutions, which were boiled for 3 min. The results were positive for invertase activity. In another set of experiments, a small quantity of the sucrose solution was mixed with the gland extract and left overnight at room temperature (20° C). This was tested with Benedict's sugar-reducing method next morning, with marked results. Several experiments were performed in each case, and sufficient evidence was obtained to show that invertase was present in the liver of *P. bengalensis*.

The work on the biochemical nature of the enzymes and their quantitative reactions in this scorpion is, however, being extended by one of us (M.S.K.).

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Paper Partition Chromatography in Taxonomic Studies[1]

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Paper partition chromatography, as applied to fresh tissues of several species of fish, yields results that seem to have value for taxonomic studies. The following technique is being used: (1) Approximately 8 mm^3 of various tissues, such as muscle, liver, and eye lens of fresh fishes, are placed on Whatman #1 filter paper and squashed with the aid of a glass pestle with a flattened tip, to form a spot about ½ in. in diameter. (Muscle proves to be the most favorable material.) (2) The tissue is allowed to dry at room temperature. (3) The chromatogram is developed in one direction by descending flow of the solvent. Two solvent mixtures are used. One is comprised of 2 parts of *n*-propanol, and 1 part of 1% ammonia; the other is a mixture of 4 parts of *n*-butanol and 1 part of glacial acetic acid, made up with 5 parts of water. (4) After development, the chromatograms are first studied under ultraviolet lamps for the presence of fluorescent spots. (5) The chromatograms are then sprayed with a 0.2% solution of ninhydrin in 95° ethanol, to which 5% 2,4,6-collidine is added before use. Black-and-white or colored photographs of the fluorescent and of the ninhydrin-positive pattern are made and kept for permanent record.

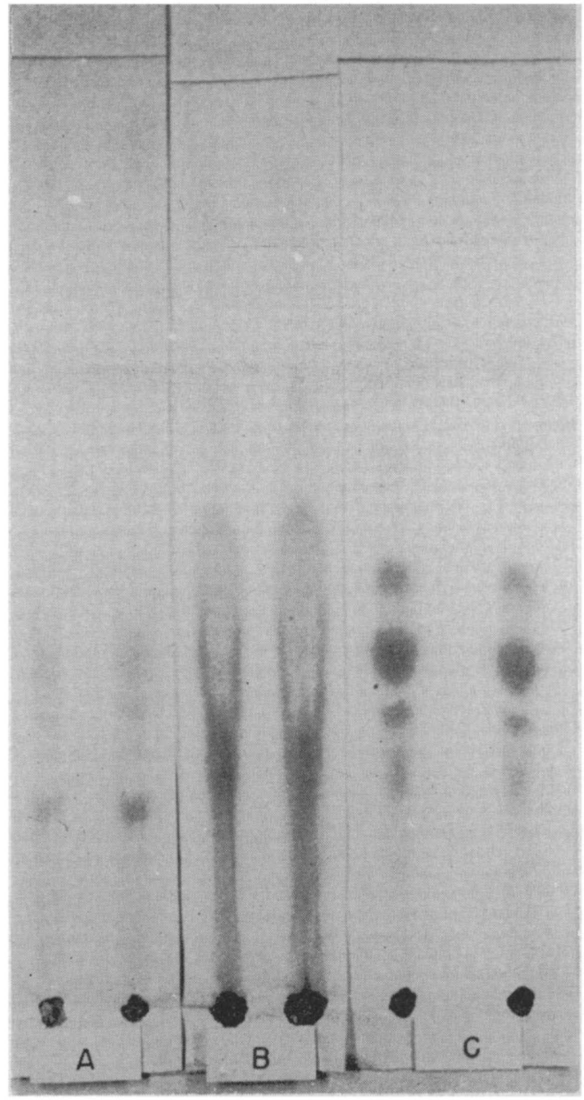

Fig. 1. Ninhydrin-positive patterns of *A, Paralabrax clathratus*; *B, P. maculatofasciatus*; and *C, Hysterocarpus traski*. Two samples of each species are presented.

Fluorescent and ninhydrin-positive patterns of a certain tissue taken from various specimens of the same species are remarkably constant, irrespective of the size or age of the fish. On the other hand, patterns obtained from muscle of different species show constant and easily recognizable differences (Fig. 1). In general, in the preliminary tests, the closer the taxonomic position of any two or more species studied, the greater the similarity of their chromatographic patterns. No extensive attempts have been made to identify the chemical nature of the substances involved, but it can be said that free amino acids do not play an important role. Comparable results have been obtained

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in other animal phyla. Preliminary results indicate that the same technique can be used to distinguish stocks of the same species belonging to populations geographically separated.

On the basis of the results obtained, it appears that this technique will become a useful tool in taxonomic and population-genetical studies, and that it may perhaps also be used for an understanding of phylogenetic relationships in biochemical terms. More complete accounts will be published elsewhere.

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Area Balance in Color Harmony: An Experimental Study

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The importance of area in color design is generally recognized both by aestheticians and practicing artists. In fact, one recent authority on composition maintains that ". . . the choice of quantity is more important than the choice of colour" (*1*). From the practice of artists an empirical "rule" has developed concerning the proper balance of areas in a design. The accepted principle is that a large area of color at a low degree of saturation will balance a small area of highly saturated color; the principle is sometimes extended to lightness—balancing of the darks against the lights. When stated in quantitative terms, this "rule" is of particular interest to experimental aesthetics, and the object of the present preliminary investigation is to examine two quantitative hypotheses that have been proposed, with a view to testing their predictive value. The first hypothesis was suggested by A. H. Munsell (*2*), a practicing artist who developed the Munsell Color System, and the second was put forward more recently by Moon and Spencer (*3*).

Munsell gives the following quantitative "rule" for areas:

> The stronger the color . . . the smaller must be its area; while the larger the area, the grayer the Chroma. Thus, R 7/6[2] balances R 3/3 in the proportion of nine parts of the lighter red to forty-two parts of the darker red. In other words, these symbols will balance colors inversely as the product of their factors. This opens up a great field of area (*2*).

Cleland, in his "Practical Description of the Munsell Color System" (*4*), has stated the same principle in the following terms:

> We . . . have to take the Value into account in determining the amount of area of these two colors to be used if we are to arrive at a perfectly balanced color design; and this is done by the simple process of multiplying the Chroma by the Value of each of the colors.

[1] The author is grateful to H. J. Eysenck for his helpful comments and suggestions.

[2] That is, in terms of the usual Munsell notation: Hue Value/Chroma.

Moon and Spencer (*3*) also claim that relative area is a function of both value and chroma. They consider that a pleasing balance is obtained when the product of each area and its distance from the "adaptation point" are the same, in color-space. (The "adaptation point" is simply the general level to which the eye is adapted when viewing the color patches.) The color-space to which Moon and Spencer refer is a metric-space that they have developed by making a mathematical transformation of the C.I.E. color-space (*5*). The reason for constructing this particular space was to provide a suitable system for the geometrical formulation of color harmony; the ordinary C.I.E. space was considered unsuitable because it is an affine color-space, "where angles in general do not have any meaning and where distances in different directions cannot be compared" (*5*). It is not necessary, for the present purpose, to discuss the nature of this metric-space in detail, for it is correlated with the Munsell system, and Moon and Spencer's hypothesis may be translated in terms of Munsell notation. But it is necessary to consider their system very briefly, for it is in terms of the metric-space that they have put forward their basic postulate. This postulate is stated as follows: "A pleasing balance among *n* color patches is obtained when the scalar moments about the adaptation point in ω-space are equal, for all the patches" (*3*). This postulate will become obvious from Fig. 1, which shows both the rectangular and cylindrical coordinates of Moon and Spencer's system.[3]

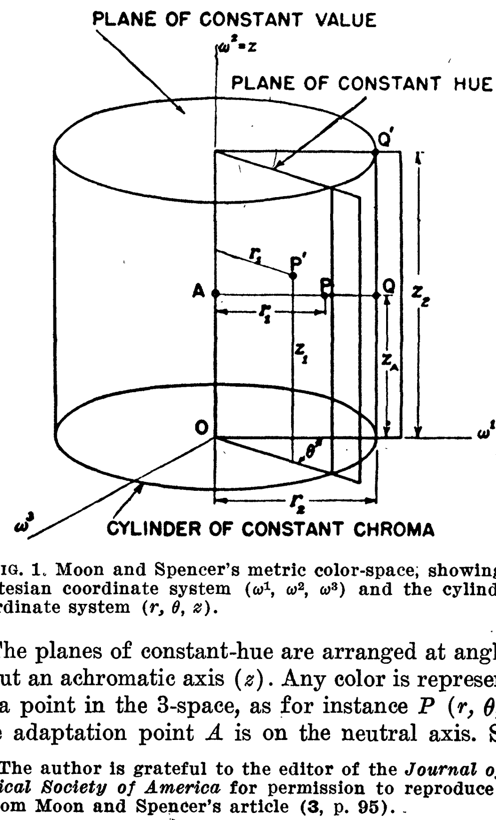

FIG. 1. Moon and Spencer's metric color-space, showing the Cartesian coordinate system (ω^1, ω^2, ω^3) and the cylindrical coordinate system (r, θ, z).

The planes of constant-hue are arranged at angles θ about an achromatic axis (z). Any color is represented by a point in the 3-space, as for instance P (r, θ, z). The adaptation point A is on the neutral axis. Sup-

[3] The author is grateful to the editor of the *Journal of the Optical Society of America* for permission to reproduce Fig. 1 from Moon and Spencer's article (3, p. 95).