

retained, not as a condition of copyright but for the purpose of keeping a complete record of national literary and artistic achievement. The publisher, who must in any case furnish the Copyright Office with proper evidence that each publication was manufactured in the United States, is asked at the same time to deposit two copies with the Copyright Office. This arrangement is believed to incur no hardship upon anybody.

Statutory damages, much revised, are retained as a deterrent to infringement. This principle has been characteristic of every copyright law in the United States since 1790; in addition, however, the right to sue for statutory damages, under the provisions of the new bill, is dependent upon the fulfillment of all acts prescribed therein, or, to put it the other way, failure to fulfill the provisions of the bill automatically deprives the delinquent of his rights to statutory damages.

The bill that has been constructed upon these principles contains a number of new provisions: for example, it specifies among the non-infringing uses of copyrighted works the conditions under which libraries and individuals may use microcopy or other photographic process for the copying of manuscripts or of books no longer available for purchase. New techniques or new methods of diffusion are recognized and special provisions are made for non-infringing uses in relation to depicting or broadcasting public scenes or news events. The section on alien authors has been carefully rewritten, and includes extended jurisdiction of the presidential proclamation in international copyright matters. The manufacturing requirements for foreign English language works eliminate the old *ad interim* clause and set a generous importation quota for a trial sale edition. If the author or other owner imports more than the 500 printed copies permitted, in addition to the sales to libraries and certain other individual exceptions, the punishment is loss of protection for the right that has infringed the regulation; all other rights are retained.

Space prevents further summary of the content of S.3043. It is published in full in the *Congressional Record* of January 8, 1940, pages 134-49.

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AMERICAN COUNCIL OF
LEARNED SOCIETIES

TYPES OF ANIMAL REFLEXES

THE usual type of reflex mechanism in animals consists of an afferent nerve path extending from a sense organ to some part of the central nervous apparatus whence an efferent nerve path leads to an outlying effector, commonly a muscle, gland or other like organ. This type of reflex mechanism, whose recognition dates

from the days of Descartes, is well exemplified in the melanophore system of the catfish (*Ameiurus*) in which afferent nerve paths extend from the fish's eyes to its central nervous organs whence efferent nerve paths pass outward to the melanophores in its skin. This system is concerned with the reflex darkening of the fish which results from an expansion of its integumentary melanophores when, for instance, the fish is in a brightly illuminated, black-walled vessel.

Catfishes likewise become dark by means of a second system essentially independent of the one just described. When bright light falls on the skin of a catfish, it stimulates certain photoreceptors whereby impulses are generated that pass over the integumentary nerves to the central nervous organs where they reach the pituitary gland on the base of the brain. These impulses excite the discharge of one of the secretions of this gland, intermedin, which is then transported by the circulatory fluids of the fish, blood and lymph, from the place of origin to melanophores in the skin. Here the intermedin causes the melanophores to disperse their pigment and thus to darken the fish. This type of response is as truly reflex as the first one, but it differs from that one in having a humoral efferent arm in place of a nervous one. Its afferent arm, however, remains, as in the typical reflex, purely nervous. Such a reflex is thus easily distinguished by its humoral efferent component and may be designated in consequence of the sequence of its two components a neurohumoral reflex.

From the standpoint of humoral substitution a third type of reflex may be anticipated. In this the afferent arm would be humoral and the efferent nervous. As a matter of fact, such a reflex is to be seen in the respiratory organization of the higher vertebrates. Here the humoral afferent arm is represented by the stream of lymph and blood carrying carbon dioxide or other exciting metabolite from the animal's tissues to the respiratory center in its medulla oblongata. The nervous efferent arm in this reflex is the motor nerve connections between the medulla and the respiratory muscles. If the preceding example in consequence of the sequence of its components may be called neurohumoral this one for the same reason may be termed humeroneural. Thus, when neurohumors are taken into consideration, at least three types of animal reflexes can be distinguished, purely nervous, neurohumoral and humeroneural.

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