sian River. Should a part of the upper course of a tributary have been transferred from one system to the other, it would have carried with it only such forms as it harbored, thus introducing to the recipient basin a comparatively limited fauna. This condition is apparently what we find in the Russian River system. Its fauna is like that of the upper courses of the streams tributary to the Sacramento which flow from the western side of the great valley, the channel forms common to the main river being absent.

It is fair to conclude that the fish fauna of the Russian River was probably derived from the Sacramento system, and a study of the species offers the suggestion that the intermingling of their waters, by which the species were introduced, was not affected by a main-channel connection, but rather by a process of stream-robbing something like that described by Holway, only that the transfer was in the opposite direction. J. O. SNYDER

THE MOTH-PROOFING OF WOOLENS

WHEN living in Swatow, China, my house, like all dwellings within the tropics, was infested with various kinds of insects. In experimenting with diverse substances with a view to self-protection against insect pests, I found that alum was a perfect preventive of the ravages of moths among woolens.

It is well known that the female clothes-moth deposits her eggs in woolen goods, and that the worm-like larvæ hatched from these eggs subsist upon the wool until they attain the general form of the adult moth. The Chinese, who are the great practical economists of the world, do not ordinarily wear woolen garments. They are well protected from cold by an interlayer of raw cotton between the lining and the surface fabric of their winter apparel, which is often made from very light-weight silk or linen. Nevertheless, the clothes-moth is ubiquitous in China, and undisturbed woolens are soon riddled by its developing progeny.

I gave the alum a severe test by immersing picture-cords made wholly of wool, in a saturated solution for several hours, and afterward using the cords to suspend framed pictures. These cords, numbering a score or more, sustained heavy pictures for over three years, without showing sign of weakness.

A basket of soft worsteds, that I had used in testing the Chinese for color-blindness by the Seebeck and Holmgren method, were likewise treated with alum, and left uncovered and undisturbed for more than a year without attack from moths. The colors of these worsteds, although diverse and delicate, were not altered by the soaking in alum water.

Woolen shawls and other articles were fortified against moths in the same way, and remained intact for several years.

The alum does not evaporate, and is therefore permanently effective in unwashed fabrics.

There is apparently no reason why wools used in manufacturing cloth, rugs and carpets should not be so treated with alum as to become moth-proof. Crude alum is inexpensive and probably one pound of it in four quarts of water would make a solution of sufficient strength for the practical result aimed at. The commercial value of woolen goods would be enhanced by this process, and "the house beautiful" would be more easily kept.

Holland, writing of these troublesome immigrants from the old world, says ("Moths," p. 426) that the depredations of clothes-moths cost the citizens of the United States annually a sum of money which is enough in amount at the present time to pay the interest on the national debt. ADELE M. FIELDE

SEATTLE, WASH.,
November 22, 1907

PINK KATYDIDS.

TO THE EDITOR OF SCIENCE: Referring to your page 639 (Vol. XXVI.), I have captured pink katydids at East Hampton, L. I., probably on four to six different occasions in the last twenty years. One year—I should say in the seventies—I had three at one time. No one there had ever seen any—although no professional entomologist was in town. I also found one at South Lyme, Conn., in the summer of 1906. All that I have ever found were a bright shell pink. I did not note the sex of any of my specimens, which were all

liberated after showing them to curious friends.

J. Stanford Brown

SPECIAL ARTICLES

RIGHT-HANDEDNESS AND PERIPHERAL VISION

Of right-handedness, three facts seem to be fairly well established: it is hereditary, it develops by a method of trial and error in the seventh month of life, it is due to some as yet unknown ascendency of the left hemisphere of the brain. That it is inheritable points to its origin as a congenital variation. That it develops in the seventh month of life points to its dependence upon the ripening of some bodily structure. The precise manner in which it is dependent upon the left hemisphere has never been satisfactorily explained. In fact, the very pertinent question whether the ascendency of the left hemisphere rests in the sensory or motor areas has, seemingly, never been raised. Reflection will show that the initial difference must be sensory and not motor. If the reflex act concept of the manner of working of the nervous system is correct, and if, as a consequence of that concept, currents of innervation flow only from afferent to efferent neurones, always in the "forward direction," it follows that the ascendency of the left hemisphere must, in the first instance, exist in the sensory neurones. For, the contraction of muscles of the right arm is merely a consequence of the discharge of nerve cells in the left motor cortex. But, the discharge of these cells is, again, a consequence, merely, of the discharge of sensory cells which are situated either in the sensory cortex or, possibly, in the periphery. If this reasoning is sound, it follows that where there is motor bilateral asymmetry there must first be sensory bilateral asymmetry.

Experiments[1] carried out during the past year, on the comparative sizes of objects which are seen in indirect vision, brought to light the fact that a marked difference in the perception of size exists between the right and left halves of the retinæ of the two eyes. The experiments were made with a perimeter. The objects compared were the orbits described by two black spots which were borne upon the peripheries of two slowly moving white cardboard discs. The spots were attached to movable radii so that the orbit of the apparently larger disc could be reduced until it equaled, subjectively, the orbit of the smaller. In this way, quantitative measurements were made for four meridians, vertical, horizontal and two oblique, and for three parallels of latitude, 10°, 20° and 25°, of the visual field. The observations were either (*a*) peripheral comparisons, in which the discs were situated in the periphery of the field of vision, upon some one of the four meridians, on opposite sides of the fixation point or (*b*) foveal-peripheral comparisons, in which one disc covered the fixation point and the other occupied some position in the periphery. The results of both (*a*) and (*b*) follow. (i.) The discs on the upper vertical, right-upper oblique, right horizontal and right-lower oblique meridians appear larger than similar discs symmetrically placed on opposite sides of the fixation point or at the fixation point. (ii.) This result is constant for *both* eyes. (iii.) The enlargement is greatest at 25° from the fixation point and least at 10°. (iv.) The enlargement is greater in the right-upper field than in the right-lower field. When it was seen that objects in the right half of the field of vision are imaged upon the left corresponding halves of the retinæ and that these halves of the combined eye are connected with the left occipital hemisphere, it was suggested that the illusion of size might be reversed with left-handed persons, who are, presumably, right-hemisphered. To test this point, crude observations were made with small clay discs and larger cardboard discs, placed upon a table, about 12 cm. apart, in front of the observer. The observer looked with one eye at a time, from a height of about 75 cm., at the middle point between the discs and compared, in indirect vision, their size. 183 observations were made. To 100 persons, the right disc appeared larger to both eyes. To 45 persons, the left disc appeared larger to both eyes. These results, as unequivocal, are the only ones that need be

[1] For a full report on these experiments, see a forthcoming article in *The Psychological Review.*