so, and then issues in the perfect state. The investigation was undertaken with a view to determine the cause of the drooping and withering of so many leaves of the Buckeye tree in the spring. This withering of the leaves gives the tree a peculiar appearance, and is calculated to arrest the eye of an entomologist. For full details consult "Psyche" for 1881.

RETARDED DEVELOPMENT IN INSECTS. By C. V. RILEY, of Washington, D. C.

[ABSTRACT.]

IN this paper the author records several interesting cases of retarded development in insects, whether as summer coma or dormancy of a certain portion of a given brood of caterpillars, the belated issuing of certain imagines from the pupa, or the deferred hatching of eggs. One of the most remarkable cases of this last to which he calls attention is the hatching this year of the eggs of the Rocky Mountain Locust, or Western grasshopper (*Caloptenus spretus*) that were laid in 1876 around the Agricultural College at Manhattan, Kans. These eggs were buried some ten inches below the surface, in the fall of 1876, in grading the ground around the chemical laboratory. The superincumbent material was clay, old mortar and bits of stone, and a plank sidewalk was laid above all. In removing and regrading the soil last spring, Mr. J. D. Graham noticed that the eggs looked sound and fresh, and they readily hatched upon exposure to normal influences, the species being determined by Mr. Riley, from specimens submitted by Mr. Graham. Remarkable as the facts are, there can be no question as to their accuracy, so that the eggs actually remained unhatched during nearly four years and a half, or four years longer than is their wont, and this suggests the significant question: How much longer could the eggs of this species, under favoring conditions of dryness and reduced temperature, retain their vitality and power of hatching?

Putting all the facts together, Mr. Riley concludes that we are

as yet incapable of offering any very satisfactory explanation, based on experiment, of the causes which induce exceptional retardation in development among insects. It is a very general rule that a rising temperature stimulates and accelerates growth, while a falling temperature retards and torpifies, and experiments recorded by the author[1] show that such is the case with regard to the eggs of *Caloptenus spretus*. But there are many strange exceptions to the rule. The eggs of Crustaceans as those of *Apus* and *Cypris* are known to have the power of resisting drought for six, ten or more years without losing vitality, while in some cases they seem actually to require a certain amount of desiccation before they will hatch. Yet the fact remains that different species act differently in this respect. In short, nothing is more patent to the observing naturalist than that species, and even individuals of the same species, or the progeny of one and the same individual, act very differently under like external conditions of existence; in other words, that temperature, moisture, food, etc., influence them differently. Hence, as has been shown by Semper to be the case with other animals, so it is with insects, changes in the external conditions of existence will not affect the fauna as a whole equally but will act on individuals. We can understand how this great latitude in susceptibility to like conditions may and does in the case of exceptional seasons prove beneficial to the species by preserving the exceptional individuals that display the power to resist the unusual changes, but we shall find ourselves baffled when we come to seek a demonstrable explanation of the cause or causes of such retardation; while the principles of evolution afford us the only hypothetical one at all satisfactory. In the innate property of organisms to vary and in the complex phenomena of heredity we get a glimpse at the cause—a partial explanation—of the facts of retarded development, for the exceptional tendency in the present may be looked upon as a manifestation through atavism of traits which in the past had been more commonly possessed and more essential to the species. This hypothesis is strengthened by the fact that the period of two, three or more years occupied in full development by exceptional individuals of a species which normally goes through its transformations within one year, is, at the present day, the normal period in other species belonging often to the same natural order.

[1] 9th Rep. Ins. of Mo.; also 1st Report U. S. Ent. Comm.

ON THE OVIPOSITION OF PRODOXUS DECIPIENS. By C. V. RILEY, of Washington, D. C.

[ABSTRACT.]

IN his paper treating of this insect, read at the Boston meeting, the author stated that oviposition had not been observed. He has studied it carefully the past summer, and finds that, as the structure of the ovipositor would indicate, the female stations herself lengthwise with the axis of the stem usually head upward, and literally saws through the epidermis with an up and down motion just such as a carpenter would make in endeavoring to work the tip of an ordinary hand-saw into the trunk of a tree. She never has anything to do with the stigma of the flower as *Pronuba* does, and the important and interesting fact is recorded that the eggs of *Prodoxus* are all inserted while the stem is soft and before the flowers begin to open, *i. e.*, before *Pronuba* usually appears. As soon as the flowers begin to open (in *Yucca filamentosa*, the species upon which the observations were made), the stem has become too hard to permit the female to do her work, and the species has for the most part disappeared, only a few belated individuals being subsequently found, and these, so far as could be observed, perishing without issue. In experiments made to test the matter it was found that where a female succeeds in inserting the ovipositor into a stem that had become hard, she perished in the effort to disengage herself and remained firmly attached to the stem.

NEW INSECTS INJURIOUS TO AGRICULTURE. By C. V. RILEY, of Washington, D. C.

[ABSTRACT.]

ALMOST every year the appearance of some insect or insects injurious to agriculture, but previously unknown in an injurious capacity, has to be recorded. The present year (1881) has afforded several striking examples, as *Crambus vulgivagellus* which has seriously injured pastures, and *Phytonomus punctatus* which has proved destructive to clover, in the state of New York.

A new Pyralid has also very generally ravaged the corn plants

in the southern states. These new destructive species may either be (1) recently introduced species from some foreign country, (2) native species hitherto unobserved or unrecorded, and new in the sense of not being described, or (3) native species well known to entomologists, but not previously recorded as injurious.

The author argues that in the last two categories, more particularly, we frequently have to deal with newly acquired habits, and in the second category with newly acquired characters that in many cases systematists would consider of specific value. In short, he believes that certain individuals of a species, which has hitherto fed in obscurity on some wild plant, may take to feeding on a cultivated plant, and with the change of habit undergo in the course of a few years a sufficient change of character to be counted a new species. Increasing and spreading at the rapid rate which the prolificacy of most insects permits, the species finally becomes a pest and necessarily attracts the attention of the farmer. The presumption is that it could not at any previous time have done similar injury without attracting similar attention; in fact that the habit is newly acquired. The author reasons that just as variation in plant life is often sudden, as in the "sport," and that new characters which may be perpetuated are thus created; so in insects there are comparatively sudden changes which under favoring conditions, are perpetuated. In this way characters which most systematists would consider as specific, originate within periods that are very brief compared to those which evolutionists believe to be necessary for the differentiation of specific forms among the higher animals.

THE SYRIAN BEES. By A. J. COOK, of Lansing, Mich.

A LITTLE less than two years since, two American gentlemen, D. A. Jones, of Canada, and Frank Benton, of Michigan, started for the old world in quest of new races or species of bees, with the hope that they might discover and introduce into America some new and valuable races or species. After visiting the principal apiaries of Europe, they located in Cyprus, where they established a large apiary in the city of Larnaca. Mr. Benton remained in Cyprus, in charge of the bees, which consisted of two distinct varie-