

shorter (4 mm.) pronotum, and a much longer (11.5 mm.) and straighter ovipositor. To be looked for northward.

⁴ Nebraska.

7. *Orchelimum volantum*, McNeill.

Described from Henry county, Illinois. Larger than *vulgare*, with much longer tegmina. Posterior femora armed beneath.

8. *Ceuthophilus ensifer*, Packard.

A cave form described from Kentucky.

9. *Ceuthophilus niger*, Scudder.

Allied to *latens*, but wholly black with a reddish tinge. Hind femora short and unusually slender. Described from Illinois.

10. *Ceuthophilus divergens*, Scudder.

Color of *lapidicolus*, but with five, long spines on each side of hind tibiæ, which turn outward at right angles to tibiæ. Nebraska, Iowa.

11. *Hadenocus cavernarum*, Saussure.

A stone cricket, said by Prof. E. D. Cope to inhabit Wyandotte Cave,⁵ but not included in the list proper, as I have seen no specimens.

12. *Undeopsylla nigra*, Scudder.

A stone cricket, recorded from Iowa, Nebraska and Illinois, and therefore to be looked for in Indiana.

BIOLOGICAL LABORATORY, TERRE HAUTE HIGH SCHOOL, May 10, 1893.

THE BLATTIDE OF INDIANA BY W. S. BLATCHLEY, Terre Haute, Ind.

The members of the family *Blattidæ*, commonly known as cockroaches, are classed among the *Orthoptera* by reason of their biting mouth parts, and direct or incomplete metamorphosis. From the other families of that order the *Blattidæ* may be known by their depressed, oval form; their nearly horizontal head, which is bent under and almost concealed by the broad prothorax; their slender legs of equal length and size; their five jointed tarsi; and by the absence of either ovipositor or forcipate appendages at the end of the abdomen.

⁵Cope, in Repts. Ind. Geol. Surv., IV., 1872, 161, and X., 1878, 493, mentions this species under the name of *Raphidophora subterranea*, Scudder—a synonym of *H. cavernarum*.

The rings of the abdomen overlap each other and are capable of great extension and depression so that these insects seem to be pre-eminently fitted for living in the narrow crevices and cracks which they inhabit. The legs are of peculiar structure in that they are long and more or less flattened, thus enabling the cockroaches to run with surprising swiftness, so that the family has been placed by some writers in a separate sub-order, the *Cursoria*, or runners. The wing covers, or tegmina, are leathery, translucent, and, when well developed, overlap when at rest; while the wings never exceed the tegmina in length, and in some cases are rudimentary or even wanting.

From the other Orthoptera the *Blattidæ* differ widely in the manner of oviposition, as the eggs are not laid one at a time, but all at once in a peculiar capsule or egg case called an oötheca. These capsules vary in the different species as regards the size, shape, and the number of eggs they contain, but they are all similar in structure. Each one is divided lengthwise by a membranous partition into two cells. Within each of these cells is a single row of cylindrical pouches, somewhat similar in appearance to those of a cartridge belt, and within each pouch is an egg. The female cockroach often runs about for several days with an oötheca protruding from the abdomen, but finally drops it in a suitable place and from it the young, in time, emerge. While this method of oviposition is the one practiced by all the species of common occurrence in the United States, there seem to be exceptions to it, as Dr. C. V. Riley has recently recorded the fact* of an introduced tropical species, *Panchlora viridis*, Burm., being viviparous, the young emerging alive from the body of the parent, and a careful dissection of the latter showing no trace of either eggs or oötheca.

All young cockroaches resemble the parents in form but are wholly wingless, the wings not appearing until after the fifth or last moult. The young are often mistaken for mature individuals by persons who have not made a careful study of the life history of the insects; and those of one or two well known and common forms, have, in the past, even been described or figured as distinct, wingless species by some of the leading entomologists of the country.

To the paleontologist, interested in tracing back the ancestry of insects, the *Blattidæ* become at once a group of surpassing interest, for the oldest known insect, *Palæoblattina douvillei*, Brong., is a cockroach recently de-

* Insect Life, III., August, 1891, 443.

scribed from the Middle Silurian of France.* Between seventy and eighty fossil species of the family are known, principally from the Mesozoic formations, but some from all above the Middle Silurian. Mr. S. H. Scudder, of Cambridge, Mass., an eminent authority on insect paleontology, says of the cockroach: "Of no other type of insects can it be said that it occurs at every horizon where insects have been found in any numbers; in no group whatever can the changes wrought by time be so carefully and completely studied as here; none other has furnished more important evidence concerning the phylogeny of insects."

Although abundantly represented in individuals, the number of species of *Blattidae* inhabiting the Eastern United States is comparatively few, but twelve or thirteen having been recorded. Of these, seven, representing five different genera, are known by the writer to occur in Indiana. Of the seven, five are indigenous or native species, the other two having been introduced from the Old World.

In the present paper is given a synopsis of the genera occurring in the state, together with the accessible synonymy and a brief popular description of each of the species. Such notes as have come to hand during several years of observation, concerning the life history, distribution, and habits of each species, are also added.

A SYNOPSIS OF THE GENERA OF BLATTIDÆ OCCURRING IN INDIANA.

- a. Sub-anal stylets present in the males.
 - b. Last abdominal sternite of the female divided; length of body more than 22 mm.
 - c. Supra anal plate either truncate or pointed, and notched or cleft at the end I. PERIPLANETA.
 - cc. Supra-anal plate rounded, entire at the end . . II. ISCHNOPTERA.
 - bb. Last abdominal sternite of the female entire; length of body less than 15 mm. III. TEMNOPTERYX.
- aa. Sub-anal stylets absent in the males; last abdominal sternite of the female entire.
 - d. Body broad, the greatest breadth more than one-half the length; tegmina not reaching the tip of abdomen IV. ECTOBIA.
 - dd. Body narrow, the greatest breadth about one third the length; tegmina reaching to or beyond the tip of the abdomen V. PHYLLODROMIA.

*Scudder, Bulletin U. S. Geog. Survey, No. 31, page 103.

I. PERIPLANETA, Burmeister (1838.)

In this genus the sub-anal stylets of the male are well developed; the last abdominal sternite of the female is divided; the supra-anal plate is either truncate, or pointed and notched at the end, and extends farther back than the sub-genital plate; while the abdomen is wider than the front part of the body. All the femora are armed beneath, on each of the carina, with a single row of slender, curved spines, while the tibiæ bear a double row of much longer ones on each of their margins. Two of the largest species occurring in the state belong in this genus.

1. PERIPLANETA ORIENTALIS, (L.) The Oriental Cockroach. The "Black Beetle."

Periplaneta orientalis, Burmeister, Handbuch der Entom., II., 1838, 504.

Riley, Stand. Nat. Hist., II., 1884, 172, fig. 248.

Id., Insect Life, II., March, 1890, 267.

Comstock, Intr. to Ent., I., 1888, 93.

Fernald, Orth. of N. Eng., 1888, 52, fig. 21. *m.*

Hyatt & Arms, Insecta, 1890, 102, pl. 4, figs. 54, 55.

Kakerlac orientalis, Serville, Hist. Nat. des Orthopteres, 1839, 72.

Blatta orientalis, Harris, Ins. Inj. Veg., 1862, 145, fig. 66. *m.*

Rathvon, U. S. Ag. Rep., 1862, 374, figs. 4, 5.

Stylopyga orientalis, Scudder, Bost. Journ. Nat. Hist., VII., 1862, 416.

Glover, U. S. Ag. Rep., 1874, 132, fig. 4.

Female with rudimentary tegmina which do not exceed 5 mm. in length. Male with the tegmina and wings well developed, the former covering three-fourths of the abdomen, the latter almost as long. General color, dark, mahogany brown, the limbs lighter, the pronotum without a yellow margin. The supra-anal plate of the male is truncate; that of the female is rounded with a shallow notch at the end.

Measurements: Male—Length of body, 22.5 mm.; of tegmina, 14 mm.; of pronotum, 6 mm.; width of pronotum, 8 mm. Female—Length of body, 27.5 mm.; greatest width of body, 13 mm.

The eggs of the Oriental cockroach are sixteen in number, and the large horny capsule or oötheca in which they are packed is carried about by the mother for a week or longer when she drops it in a warm and sheltered place. Along one side of the capsule, which resembles in form and color a diminutive seed of the pawpaw, *Asimina triloba*, Duval, is a seam where the two edges are cemented closely together. When the young are hatched they excrete a liquid which dissolves the cement and

enables them to escape without assistance, leaving their infantile receptacle as entire as it was before they quitted it.

The Oriental cockroach, as its name indicates, is a native of Asia, but has been carried from one country to another by shipping. It delights in filth and darkness, and hence in the holds of vessels, the cellars and basements of tenement houses, and in all damp, dirty places it swarms by thousands, undoubtedly doing much good as a scavenger, but infinitely more harm on account of its omnivorous and insatiable appetite. Like most other members of the family it feeds mainly at night, appearing to detest and avoid the light, as one can readily prove by taking a lighted lamp suddenly into its haunts, when a hurried scrambling will take place towards its daylight retreats, and but a few moments will elapse before the last of the busy marauders will have disappeared.

This is probably the most carnivorous of all our Blattidæ, though, like most others, it is fond of starchy food. It is known to feed upon meat, cheese, woolen clothes, and even old leather, and is said to be especially fond of the festive "bed bug," *Acanthia lectularia* L., which soon disappears from a house infested with the Oriental roach.

In Indiana this species is found in all the larger towns and cities, and is one of the most noisome and disagreeable insects with which certain classes of their inhabitants have to contend.* It seldom occurs in houses in thinly settled localities, and never, as far as my observation goes, beneath the bark of logs and stumps.

2. *PERIPLANETA AMERICANA*, (L.) The American Cockroach.

Periplaneta americana, Burmeister, Handb. der Entom., II, 1838, 503.

Scudder, Boston Jour. Nat. Hist., VII., 1862, 416.

Riley, Stand. Nat. Hist., II., 1884, 172.

Id., Insect Life, I., 1888, 68; II., 1890, 266.

Fernald. Orth. N. Eng., 1888, 51.

Kakerlac americana, Serville, Hist. Nat. des Orthop., 1839, 68.

Blatta americana, Rathvon, U. S. Ag. Rep., 1862, 375: (In part.)

Packard, Third Rep. U. S. Ent. Comm., 1883, 309, pls. XXV.—XXXV.

From the Oriental roach this species may be readily known by its larger size and its longer tegmina and wings, which, in both sexes, reach beyond the tip of the abdomen. The supra-anal plate is more pointed and the

*For remedies see remarks under *Phyllodromia germanica* or "Croton bug."

notch at the end is narrower and much deeper. The general color is also lighter, being a reddish instead of a mahogany brown, while the pronotum is broadly margined on the sides, and narrowly in front, with yellow which encloses a large bi-lobed brown spot.*

Measurements: Male—Length of body 27 mm.; to tip of wings, 45 mm.; of tegmina, 27.5 mm. Female—Length of body, 30 mm.; greatest width of body, 14 mm.

The American cockroach is, as its specific name indicates, a native of this country; but like *P. orientalis*, it has spread to the four corners of the earth. It is by far the largest species found in the State, but seems to be of rather limited distribution as I know of its occurrence in but two counties, Putnam and Marion. It occurs in numbers in some of the leading hotels of Indianapolis, but usually confines itself to the basement and first floor, and appears to be much more cleanly in its choice of an abiding place than does the closely allied Oriental roach.

II. ISCHNOPTERA, Burmeister (1838.)

Males, with the sub-anal stylets present but minute, and often bent abruptly downward; last abdominal sternite of the female divided; supra-anal plate in both sexes rounded, not notched at the end nor extending as far backwards as the sub-genital. Body narrower and more elongate than in *Periplaneta*, the abdomen not wider than the thorax; in the males, tapering gradually to a rounded point. Legs spined as in *Periplaneta* but the spines not so long and strong as there. Two species occur in Indiana.

3. ISCHNOPTERA PENNSYLVANICA, (DeGeer.) The Pennsylvania Cockroach.

Platamodes pennsylvanica, Scudder, Bost. Jour. Nat. Hist., VII., 1862, 417.

Riley, Stand. Nat. Hist., II., 1884, 172.

Comstock, Intro. Ent., I., 1888, 93.

Blatta pennsylvanica, Thomas, Trans. Ill. St. Agl. Soc., V., 1865, 440.

Ischnoptera pennsylvanica, Packard, Guide, Stud. Ins., 1883, 576.

McNeill, Psyche, VI., 1891, 78.

Ectobia lithophila, Scudder, Bost. Jour. Nat. Hist., VII., 1862, 418.—(juvenile.)

Blatta americana, Rathvon, U. S. Ag. Rep., 1862, 375. (Note and fig. 5 a.)

Tegmina, long and narrow, extending, in both sexes, much beyond the tip of abdomen. Wings as long as tegmina. Disk of pronotum dark brown, margined on sides, and sometimes narrowly in front, with pale

* In this respect it is quite similar to *Ischnoptera pennsylvanica* DeGeer, from which it may be readily distinguished by its much broader body and fissured supra-anal plate.

yellow. Tegmina reddish brown, with the outer basal third rather broadly margined with transparent whitish. Antennæ dusky, reaching back but little beyond the tip of tegmina. Measurements: Male—Length of body, 21 mm.; to tip of tegmina, 27 mm.; of tegmina, 22 mm.; of antennæ, 28 mm.; of pronotum, 5 mm.; width of pronotum, 6 mm. Female—Very nearly the same, the body being a little wider.

This is a native species and is the most common cockroach in the State, being found everywhere beneath the loose bark of logs and old stumps. It is usually seen in the wingless stages, the mature individuals being common only from May to October. The half grown young, described by Scudder, as *Ectobia lithophila*, are of a shining, dark brown color, the dorsal surface of thoracic segments often lighter. As mature specimens are attracted by light, country houses are often badly infested with them; and where food is scarce, the wall paper is sometimes much injured for the sake of the paste beneath. What the hordes of young which dwell under the bark of logs live upon is a question as yet unsettled, but the larvæ of other insects undoubtedly form a portion of their food, as in two instances I have found them feeding upon the dead grubs of a *Tenebrio?* beetle; while living, as well as decaying vegetable matter probably forms the other portion. The mating of the imagoes mostly occurs in late summer and early autumn, the newly hatched young being most abundant from mid September until December. The young in various stages of growth survive the winter in the places mentioned, they being the most common insects noted in the woods at that season. Cold has seemingly but little effect upon them, as they scramble away almost as hurriedly when their protective shelter of bark is removed on a day in mid January with the mercury at zero, as they do in June when it registers a hundred in the shade.

The empty oöthecæ of this species are very common objects beneath the loose bark of logs and especially beneath the long flakes of the shell bark hickory. They are chestnut brown in color, from 7.5 to 10 mm. in length by 4 mm. in breadth, and are much less flattened than those of *Phyllodromia germanica*, or "Croton bug," described below; while the dorsal or entire edge is slightly curved or bent inwards, after the fashion of a small bean. The young, after hatching, evidently escape in the same manner, as do those of the Oriental cockroach, as no break is visible in the empty capsule.

4. ISCHNOPTERA UNICOLOR, (Scudder.)

Platamodes unicolor, Scudder, Bost. Jour. Nat. Hist., VII., 1862, 417.

Fernald, Orth. New Eng., 1888, 53.

Ischnoptera unicolor, Scudder, Proc. Bost. Soc. Nat. Hist., XIX., 1877, 92.

McNeill, Psyche, VI., 1891, 78.

A much smaller species than the preceding but, like it, having both wings and wing covers exceeding the abdomen. General color a pale shining reddish brown. Head and posterior margin of pronotum darker as is also the apical third of the abdomen beneath. Antennæ slender, tapering, reaching backwards to the end of the wing covers. Length of body, 12 mm.; to tip of tegmina 19 mm.; of tegmina 16 mm.; of pronotum, 3 mm.

A single male of this species was taken from beneath an electric light in Terre Haute, Indiana, on the evening of June 12, 1892. On May 28, 1893, a number of others were secured in low ground from beneath the bark of a red oak stump. They had evidently just reached maturity and were in company with the imagoes and young of *I. pennsylvanica*. On being exposed to view a number of them flew about 50 feet to a clump of May apple stems, down which they ran and endeavored to hide beneath some dead leaves. Nothing farther of its habits is known by the writer but they are presumably the same as those of *I. pennsylvanica*. It has been noted at no other point in Indiana and heretofore has been recorded only from the New England States, Illinois, and Iowa.

III. TEMNOPTERYX, Brunner (1865).

The males of this genus have the sub-anal stylets present, but minute; the last abdominal sternite of the female is broadly rounded and entire; supra-anal plate of both sexes with the apex rounded, entire, equal in length to the sub-genital. Pronotum with its lateral edges roundly deflexed as in *Periplaneta*, rather than flaring outwards as in *Ischnoptera*; much broader in the female than in the male. Body of male rather slender; that of female stouter with the abdomen broader than the thorax.

5. TEMNOPTERYX DEROPELTIFORMIS, Brunner.

Temnopteryx deropeltiformis, Brunner, Nouv. Syst. des Blattaires, 1865, 87.

Tegmina of females rudimentary covering only about one-third of abdomen; those of the males fully developed, surpassing the abdomen by 5 mm. Color a uniform dark mahogany brown except the tibiæ and tarsi of all the legs which are a light reddish brown, the contrast between the two colors in living specimens being very striking.

Measurements: Male—Length of body, 14 mm.; of tegmina, 15.5 mm.; of pronotum, 3.5 mm.; width of pronotum, 4.5 mm. Female—Length of body, 13 mm.; of tegmina, 4 mm.; of pronotum, 4.5 mm.; width of pronotum, 6 mm.

In Indiana this handsome cockroach has been noted only in Vigo county, and there in but one locality, the border of a marsh in a low, sandy woods three miles east of Terre Haute.

A single pair were taken on May 28th, and on June 18th probably a dozen specimens were secured. They were hiding beneath small logs and sticks, and the males when deprived of their shelter flew actively away while the females could but crawl, and that rather sluggishly for a Blattid, towards a new hiding place.

Brunner (*loc. cit.*) recorded it from "Amerique du Nord," and I can find no other note of its occurrence in the United States.

IV. ECTOBIA, Westwood (1839).

Sub-anal stylets of males wanting; last abdominal sternite of females entire. Supra-anal plates rounded, entire, somewhat carinated above. Abdomen much broader than front portion of body, its greatest breadth contained less than twice in its total length. Tegmina, in both sexes, not reaching tip of abdomen.

6. ECTOBIA FLAVO-CINCTA, Scudder. The Short-winged Cockroach.

Ectobia flavo-cincta, Scudder, Bost. Journ. Nat. Hist., VII, 1862, 418.

Comstock, *Intr. to Ent.*, I., 1888, 93.

Blatta? flavo-cincta, Fernald, *Orth. N. Eng.*, 1888, 51.

This is a short, broad-bodied, native species, in which the tegmina cover only about two-thirds of the abdomen, while the wings are much shorter. The disk of pronotum and dorsal surface of abdomen are dark brown, the tegmina reddish brown. A rather broad yellowish stripe extends from the head along the deflexed lateral border of pronotum and the basal third of tegmina. The sides of the lower half of the face are white, and all the limbs are pale yellow. Antennæ dark brown, a little longer than the body.

Measurements: Length of body, 16 mm.; of tegmina, 9 mm.; of wings, 6.5 mm.; of antennæ, 18 mm.; of pronotum, 5 mm.; width of pronotum, 6.5 mm.; width of abdomen, 9.5 mm.

Mature individuals of this species are not uncommon beneath bark and logs from June to October. Specimens of such are in my collection from Marshall, Putnam, and Vigo counties. I have not, as yet, been able

to distinguish the young from those of *Ischnoptera pennsylvanica*, found in the same localities. A single female with oötheca protruding was taken on September 3, 1892. The oötheca is dark brown and smaller than that of any other species known to me, measuring only 5x4 mm.

Flavo-cincta is a species of northern range, having hitherto been recorded only from New England and the Lake Superior region.

V. PHYLLODROMIA, Serville (1839).

Sub-anal stylets and last abdominal sternites, as in *Ectobia*. Supra-anal plate truncate in the males, suddenly pointed and slightly notched in the females. Body narrow, the greatest breadth contained from two and one-half to three times in the total length. The abdomen not broader than the thorax in either sex, the sides almost parallel in the females; in the male tapering sensibly from the base. The tegmina as long as, or longer than, the abdomen.

7. PHYLLODROMIA GERMANICA, (L.) The Croton Bug. The Water Bug.
The German Cockroach.

Blatta germanica, Burmeister. Handbuch der Ent., II., 1838, 497.

Comstock, Int. Ent., I., 1888, 93, fig. 87.

Fernald, Orth. N. Eng., 1888, 50, fig. 20.

Ectobia germanica, Scudder, Bost. Jour. Nat. Hist., VII., 1862, 418.

Glover, U. S. Agl. Rep., 1874, 132, fig. 3.

Riley, Stand. Nat. Hist., II., 171, fig. 247.

Id. Insect Life, I., 1888, 68, 191.

Blatta (Phyllodromia) germanica, Serville, Hist. Nat. des Ortho., 1839, 107.

Phyllodromia germanica, Packard, Guide Stud. Ins., 1883, 576, fig. 569.

Riley, Insect Life, II., 1890, 266, fig. 57 (All stages.)

Ischnoptera bivittata, Thomas, Proc. Davenport Acad. Nat. Sci., I., 1876,

250, pl. XXXVI, figs. 1, 2.

This is the smallest of the seven species of Blattidæ which are known to occur in the State. The general color is a light brownish yellow, the females often darker; all the limbs much lighter than the body; the pronotum with two dark brown, longitudinal bands enclosing a yellowish stripe. The tegmina and wings of the male extend to the end of abdomen, those of the female are a little longer. Antennæ dark brown, exceeding slightly the tips of the closed tegmina. The body of the male is longer and narrower than that of the female.

Measurements: Male—Length of body, 13 mm.; of tegmina, 10 mm.;

width of body, 4 mm. Female—Length of body, 10 mm.; of tegmina, 11 mm.; of antennæ, 13 mm.

The oötheca of the Croton bug is very light brown, a little over twice as long as broad, 7.5x3.5 mm., with the sides somewhat flattened and the edges parallel. Within it the eggs, thirty-six in number, are arranged in the usual two rows. It is carried about by the mother roach for several days with from half to three-fourths of its length protruding from the abdomen, and when dropped in a favorable place the young, evidently very soon, emerge from it; for in a bottle in which a female with protruding oötheca was placed at eleven o'clock P. M. the young were found to have emerged on the following morning at eight. They were then wholly white, except the lateral edges of the abdomen, where a blackish tinge was evident. By five o'clock in the afternoon of the same day, having meanwhile eaten their fill of moistened wheaten bread, they had become too large for their skins, and had moulted for the first time. They then measured 3 mm. in length, and the head, pronotum, abdomen, and apical half of antennæ were black, while the other two thoracic rings and the basal half of antennæ were a grayish white. The half-grown young are very dark brown, with the first four or five segments bordered with yellow, and with traces of a lighter median stripe.

The "Croton bug," so called because it made its appearance in New York City in numbers about the time the Croton Aqueduct was completed, is a native of Central Europe, but like the Oriental roach, has become cosmopolitan.

It seldom if ever occurs in numbers in the country, but is one of the worst insect pests with which the inhabitants of the larger cities of the United States have to deal. It is the most fecund of all the roaches, and the seasons of mating and hatching of the young are, perhaps, more irregular than in any other species. Adult forms are evidently to be found at all seasons of the year, as I have taken them in December, April and October. It is not so much a lover of filthy surroundings as is the Oriental roach, and hence frequents more often than that species the dwellings of the better class of people. It delights in warm, moist places, and is especially abundant and destructive in buildings which are heated by steam.

As an evidence of its abundance under favorable conditions, I will mention that a single person captured for me over thirty adult specimens and fully half that number of young, in less than ten minutes in the kitchen

of the leading hotel of the city of Terre Haute. Where it once obtains a foothold and the surroundings of temperature and food supply are favorable it is almost impossible to eradicate, as its small flattened form enables it to hide and breed in cracks and crevices which none of the other roaches can enter.

Like many other omnivorous animals, Croton bugs find in wheaten flour a food substance which is rich in nutrition and easily digested, and so they prefer wheat breads and starchy materials to all other foods. On account of this liking they often do much harm to cloth-bound books by gnawing their covers in search of the paste beneath. They also seem to have a peculiar liking for paints of various kinds, and in the office of the U. S. Coast and Geodetic Survey, at Washington, have done much damage by eating off the blue and red paints from the drawings of important maps.* Townend Glover, in the U. S. Ag. Rep. for 1874, states that in his office "They made a raid on a box of watercolors where they devoured the cakes of paint, vermilion, cobalt and umber alike; and the only vestiges left were the excrements in the form of small pellets of various colors in the bottom of the box."



In giving a remedy for this, and other species of Blattidae which frequent houses, I cannot do better than quote from Dr. Riley's excellent article in "Insect Life." He says: "Without condemning other useful measures or remedies like borax, I would repeat that in the free and persistent use of California Buhach, or some other fresh and reliable brand of Pyrethrum or Persian Insect Powder, we have the most satisfactory means of dealing with these roaches.

"Just before nightfall go into the infested rooms and puff into all crevices, under base-boards, into the drawers and cracks of old furniture—in fact wherever there is a crack—and in the morning the floor will be covered with dead and dying or demoralized and paralyzed roaches, which may easily be swept up or otherwise collected and burned.

"With *cleanliness*, and *persistency* in these methods, the pest may be substantially driven out of a house, and should never be allowed to get full possession by immigrants from without."

For no other insects have so many quack remedies been urged and are

* Riley, "Insect Life."

so many newspaper remedies published. Many of them have their good points, but the majority are worthless. In fact, rather than put faith in half of those which have been published, it were better to rely on the recipe which T. A. Janvier gives (in his charming article on "Mexican Superstitions and Folk-lore," published in a recent number of Scribner's Magazine) as current among the Mexicans:

"*To Get Rid of Cockroaches.*—Catch three and put them in a bottle, and so carry them to where two roads cross. Here hold the bottle upside down, and as they fall out repeat aloud three *credos*. Then all the cockroaches in the house from which those three came will go away."

A NOTE ON *LOXIA CURVIROSTRA*. By W. S. BLATCHLEY.

ON A SIMPLE AIR THERMOMETER FOR USE IN DETERMINING HIGH TEMPERATURES.
By W. A. NOYES.

[ABSTRACT.]

The thermometer consists of a bulb of hard glass having a capacity of about 20 cc. and connected with a gas measuring tube by means of a long capillary tube. This tube is protected by means of a double walled iron tube cooled by a stream of running water. The capacity of the bulb having been determined, the amount of air expelled from it when it is introduced into the furnace furnishes the data necessary for calculating, approximately, the temperature. The apparatus was used successfully at 650° C. but for higher temperatures a porcelain bulb would be required.

THE ELECTRICAL OXIDATION OF GLYCERIN. By W. E. STONE AND H. N. McCoy.

[ABSTRACT.]

The oxidation products of glycerine vary according to the means employed. We have made use of the electric current acting upon dilute solutions of glycerine in the hopes of obtaining glyceric aldehyde. The conditions of dilution, strength of current, temperature and conducting mediums have been varied.