of avoidable trouble in electric furnace work. The furnace shown in operation at the meeting consumed 100 amperes at 10 volts when running at 2000° C. This temperature was attainable in two or three minutes. A home-made transformer with about 100 primary turns wound in two halves and three separate secondary coils that can be connected in series or parallel enables the furnace to be run off almost any ordinary lighting circuit.

Mr. R. S. Whipple, among other speakers, testified to the value and convenience of this simple form of carbon tube furnace. It was stated that Northrup in America was using a similar furnace on a larger scale for gear hardening in a motor-car factory. A thermo-couple is attached to each piece of gear and the temperature is run up until the hump on the curve shows the recalescent point to have passed. The gear is then removed and quenched. One of the furnaces exhibited by Dr. Harker was made for a steel foundry at Sheffield for standardising optical pyrometers, of which a very large number were stated to be in use.

The discussion emphasised the fact that the great desideratum at the present moment for many requirements, both in the laboratory and the works, is a furnace that will have all the advantages of the carbon tube furnace, but which will not evolve carbon compounds. Dr. Rosenhain had used a vacuum furnace wound with tungsten wire for melting pure iron (melting point 1525±5° C.), but the tungsten became brittle after heating, and was soon useless. A resistance furnace using granular tungsten working in hydrogen or nitrogen was suggested as one substitute, and another was a carbon tube furnace with an inner tube and an indifferent gas between the two. It appears, however, that zirconia tubes are being experimented with, and a successful outcome of this work is hopefully anticipated. Zirconia is one of the best refractories known, and if it can be obtained pure in granular form almost any temperature will be possible with surface combustion. Dr. Rosenhain made the useful suggestion to coat carbon electrodes or tubes—even in ordinary commercial electric furnaces—with metallic copper, iron, or aluminium by means of the Schoop spray process, as a means of ensuring good electrical contacts.

For temperatures up to 1000 or 1200° C., tube or muffle furnaces heated with nickel-chromium wire were recommended by several speakers, some of whom have abandoned gas-heating altogether for temperatures below 1000°. On the other hand, some of the modern gas burners, of which several types were described, appear to give excellent results at high temperatures. Air under high pressure is essential, and so it appears is violent mixing of the air and gas—the cause of the great noise made by these furnaces. Mr. S. N. Brayshaw described the ingenious burner which bears his name, which is displacing the oxy-hydrogen flame, too local in its heating, for melting platinum. For many experimental metallurgical purposes the Richmond gas furnace was recommended.

INSECTS IN AFRICA AND THE EAST.

AN accurate description of the Indian lac insect (*Tachardia lacca*), founded on new observations of its life-history and habits, has long been wanted by students of economic entomology. They now find this provided in the recently issued Indian Forest Memoir (Zoology, vol. iii., part 1) by Dr. A. D. Imms and Mr. N. C. Chatterjee. The various stages are illustrated by beautifully executed coloured figures, and there are enumerations of the insect's food-plants and analyses of its important secretion. A remarkable feature is the dimorphism shown in the male, which may be either winged or wingless—the latter condition very rare among Coccidæ. The Tachardia is attacked by an alarming array of enemies, of which the caterpillar of a noctuid moth, *Eublemma amabilis*, is the most formidable. It is aided in its destructive efforts by several other caterpillars of Lepidoptera, a large number of beetles and their larvæ, and a host of hymenopterous parasites.

To the December part (3) of the Bulletin of Entomological Research (vol. vi.) Dr. J. W. Scott Macfie contributes observations on the bionomics of *Stegomyia fasciata*, the mosquito that is well known as the alternate host with man of the yellow fever parasite. The female insect pairs soon after emergence, and then must have a meal of blood before laying her eggs. Fertile eggs may continue to be laid for thirty-seven days without necessity for a second pairing. The prevalent belief that this mosquito sucks blood by night only is not confirmed, "but sometimes she refuses an offer to feed in daylight in favour of the next opportunity to feed in the dark." The male's taste is gentler, as his staple food is honey.

The same part of the Bulletin contains also notes, by Dr. W. A. Lamborn, on the habits of *Glossina morsitans*—the tsetse-fly that carries sleeping-sickness trypanosomes in Nyasaland. The insects are by no means confined to the mapped "fly-belts." The preponderance in number of males among flies captured on the wing, which contrasts with the close equality of the sexes as bred from puparia, is explained by the author as due to the male's habit of pairing as the result of violent capture rather than of courtship; hence the females shun the society of the opposite sex. The slimy secretion of the Glossina larva is believed by Dr. Lamborn to afford some protection against the attacks of certain ants. Puparia are rarely found parasitised by larvæ of Mutilla and other Hymenoptera, and the adult tsetses are sometimes caught and devoured by dragonflies. Dr. Lamborn described how a dragonfly, *Orthetrum chrysostigma*, hovered around his party of six "boys," swooping down and picking off a tsetse from the back of one who stooped to drink at a pool. Many specimens of the Orthetrum were captured in the act of devouring tsetses, which appear to be equally acceptable, whether fasting or filled with freshly-ingested blood, and this species of dragonfly is evidently very expert in catching Glossina. Another kind of dragonfly (*Crocothemis erythraea*), on the other hand, handled a tsetse so clumsily as to convince Dr. Lamborn that it is a novice with this special type of prey. A description with figures of several species of chalcids which Dr. Lamborn has reared from the Glossina puparia is given by Mr. J. Waterston (*t.c.* part 4).

An addition to our knowledge of the distribution of tsetses is contained in Dr. Schweiz's paper in the third part of the bulletin; he has traced *G. morsitans* in the Katanga district of the Belgian Congo far to the west of the great river. Dr. Schwetz writes also on the range and habits of *G. brevipalpis*—a fly often overlooked as it flies before sunrise and after sunset.

G. H. C.

INTERESTING FORAMINIFERA.

IN a fine memoir[1] on Foraminifera from the Kerimba Archipelago, Portuguese East Africa, Messrs. Edward Heron-Allen and Arthur Earland deal with no fewer than 470 species and varieties, of which thirty-two are new to science. There is a striking resemblance between the general facies of the gatherings at Kerimba and that of the late Mr. F W. Millett's collection from the Malay Archipelago. The

[1] Trans. Zoological Society of London xx (1914), pp. 363–90, 3 pls.; and *Ibid.*, xx. (1915), pp. 543–794, 14 pls., 3 figs. *See also* Proc. Zoological Society of London, 1915, pp. 295–8.