for work on the biology of the carp; M. V. Fedorov, professor in the Moscow Agricultural Academy, for work on the fixation of atmospheric nitrogen by soil bacteria.

E. Agricultural Sciences

First-class prizes: K. E. Bakhtadze, doctor of agricultural sciences, for work on the biology of the tea plant; S. M. Boukasov and A. Y. Kameraz, members of the Plant-growing Institute, for joint work on selection of potatoes.

Second-class prizes: A. M. Dmitriev, professor in the Moscow Agricultural Institute, for work on meadows; V. P. Timofeev, professor of forestry, for work on forestry.

F. Medical Sciences

First-class prize: T. P. Krasnobaev, member of the Medical Academy, for work on bone and joint tuberculosis in children.

Second-class prize: P. F. Zdrodovsky, member of the Medical Academy, for work on infectious diseases.

G. Economic Sciences

First-class prize: P. I. Lyashchenko, corresponding member of the Academy of Sciences, for studies in the economics of the U.S.S.R.

H. Legal Sciences

Second-class prize: A. V. Venediktov, professor in the University of Leningrad, for work on the State socialistic property.

I. History-philological Sciences

First-class prizes: B. A. Rybakov, member of the Institute for the Study of Material Culture, for work in the history of crafts in Old Russia; S. P. Tolstov, professor in the University of Moscow, for historical-archæological work.

GROWTH OF SMALL BUSINESSES

THE paper, "Problems of Growth in Industrial Undertakings", presented before the British Institute of Management by Colonel L. Urwick on January 12, has now been issued as No. 2 of the Winter Proceedings, 1948–49, together with a report of the discussion, including written contributions. Colonel Urwick emphasizes that re-organisation is a continuous process requiring specific provision, and that one of the main tasks of re-organisation is to keep the different parts of a business in balance. Growth is essential if individuals employed by an undertaking are to grow as individuals, and balance is essential in terms of time as well as in terms of the relative strength of parts. Col. Urwick considers that factual research is needed to determine whether growth should be continuous or interspersed by periods of consolidation.

In the development of a unit business there are three critical points. First, that at which the owner-manager, or chief executive, who has, up to that point, dealt single-handed with all the major functions of the business, has to start delegating full responsibility for the initiative, as opposed to routine supervision, in one of the major functions. This involves both a personal and a personnel problem, and these problems recur with the delegation of full initiative in each of the major functions. Second is the point at which the chief executive has to start delegating full responsibility for initiative in the ancillary functions. Again, the problem recurs as each of the ancillary functions is specialized. Since such functional or specialized control cuts across ordinary line authority, its development greatly increases the volume of co-ordination required; and the third critical point is accordingly that at which this additional co-ordination compels the chief executive to take special measures to prevent himself being overwhelmed.

One measure Col. Urwick suggests here is the use of officials in a true 'staff' capacity; but he points out that, at each stage, organisation tends to lag behind requirements and the chief executive to exceed his span of control, either because he is temperamentally unable to delegate or because he is unaware of the importance of leaving himself sufficient time to lead his team. Col. Urwick's paper is illustrated with a series of organisation charts setting out the development of a one-, two-, three- or four-man business into complete functional control of a unit business.

EFFECTS OF LIGHT INTENSITY AND DAY-LENGTH ON REPRODUCTION IN THE ENGLISH SPARROW

THE effects of light intensity and day-length on reproduction in the English sparrow have been studied quantitatively in the laboratory by George A. Bartholomew, jun. (*Bull. Mus. Comp. Zool., Harvard*, 101, No. 3; Feb. 1949). He has also considered the ecological significance of these factors in controlling the breeding season of this species in Nature.

A quantitative evaluation of the effects of five different intensities of light was obtained by exposing sparrows to these light intensities during uniform day-lengths of sixteen hours. In the male, 10 foot-candles was more effective than lower intensities and was as effective as either 52 or 244 foot-candles in causing gonadal development in the winter. During the autumn, however, 10 foot-candles was much less effective than 244 foot-candles, indicating a seasonal variation in response to light intensity. The minimum light intensity which caused full spermatogenic activity was 0·7 foot-candles; but slight testicular activity was caused by 0·04 foot-candles.

Experiments testing the effect of differing light intensities during sixteen-hour days showed that in the female, as in the male, gonadal growth increased with increasing intensity. These experiments, limited to the winter, showed that after forty-six days the highest intensity used (244 foot candles) caused more ovarian development than any of the lower intensities. By eighty-six days, however, gonadal regression had set in and ovarian size was no longer correlated with light intensity. This confirms the observations of previous investigators that light alone will not cause full ovarian development in this species.

The effect of light intensity during uniformly short days was investigated, and it was found that 270 foot-candles was no more effective than 25 foot-candles in causing testicular development after an exposure of twenty-five days to ten hours of light per day during winter.

A quantitative evaluation of the effects of different lengths of day was obtained by exposing male and

female sparrows to day-lengths of ten, twelve, fourteen, sixteen and twenty-four hours at a uniform light intensity. In the male, gonadal development increased with day-length. During an exposure of eighteen days the greatest relative increase in testicular response occurred between day-lengths of twelve and fourteen hours; days longer than fourteen hours produced little further development. During an exposure of forty-six days, however, it was shown that males could be brought to full breeding condition in winter by a day-length of only ten hours. In the female, as in the male, gonadal growth increased with increased day-length; but during a thirty-day exposure the greatest relative increase in ovarian development occurred between day-lengths of sixteen and twenty-four hours, and no ovarian growth occurred on day-lengths of eight or ten hours. During an experiment lasting approximately 3½ months, females kept on a uniform day-length of eight hours showed no gonadal growth.

The difference in the degree of reproductive response of males and females to light is probably explained by the fact that the testis responds to lower concentrations of gonadotropic hormones than does the ovary, rather than by a difference in the sensitivity of the male and female pituitaries to light.

Light intensity in Nature falls low enough to modify the photoperiodic response of the sparrow only near sunrise and sunset. The presence or absence of clouds may cause a difference between the photoperiodically effective length of consecutive days, which is as great as the seasonal change in day-length during the month of January.

In the English sparrow an internal rhythm is important in determining the breeding season. Increased day-length in the spring reinforces this internal rhythm and ensures that all males reach reproductive competence in the spring rather than at some other season. The time of onset of breeding determines the onset of the reproductive refractory period. Consequently, the spring breeding season causes this refractory period to occur during the autumn and early winter. The end of the refractory period in turn determines the time when the sparrow can again respond to day-length. As a result, in this species the season of reproduction is controlled by the interrelationship between the seasonal change in day-length and the internal reproductive rhythm.

T. H. HAWKINS

PRISON CAMP GEOLOGY

THE fascinating memoir, referred to below*, is worthy of notice, not only because it is a major contribution to 'hot front' petrology and deep-seated tectonics, but also because of the extraordinary conditions under which the research it records was carried out. The University of Edelbach was founded by French prisoners-of-war in Oflag XVII *A* (1940–45). Not content with lectures alone, the geologists made a thorough investigation of the area—only 400 metres square—enclosed within the barbed wire. No stone was left unturned, and trenches and secret tunnels provided many critical exposures. A microscope was constructed in the camp and equipped with polarizers improvised from piled cover glasses. Thin sections were mounted with a mixture of violin wax and edible fat. Only the determination of certain untwinned feldspars remained to be completed on the return to France.

The greater part of the memoir is devoted to the crystalline rocks of the Waldviertel complex and the syntectonic granitization phenomena displayed by them. The country rocks are tectonites with pronounced linear structures. They include biotite- and graphite-schists, and types ranging from plagioclasite to amphibolite, all originally poor in quartz. Some excellent examples of micro-tectonic analysis are given, and it is shown that in spite of the intense deformation undergone, lattice discontinuities have been largely healed by granoblastic 're-cooking'. Movement and recrystallization were probably simultaneous, rather than alternating, phenomena. Granitization and what was formerly styled 'injection', due to geochemical migrations, consisted of quartzification, followed by development of perthitic orthoclase at the expense of both the original rock material and the newly crystallized quartz. The evidence suggests that while diffusion through the lattices took place locally, the main transport was by way of intergranular boundaries. Complementary to the addition of silicon and potassium, the cafemic elements calcium, iron and magnesium were expelled from the granitization zone to form basic fronts in the surrounding rocks. The amphibolitic aureoles of the Moldanubian 'orthogneiss' are believed to be large-scale results of the same process.

It is shown that quartz and orthoclase were remarkably plastic during the physico-chemical conditions that attended their formation, and that, in consequence, the granite formed by the transformation of pre-existing rocks could readily become intrusive. It follows that to prove a granite intrusive does not prove that it has ever been in a liquid condition.

The memoir is full of important observations and stimulating suggestions, and should be read by all workers in the field of plutonic geology.

* Métamorphisme, silicifications et pédogénèse en Bohême Méridionale. By F. Ellenberger in collaboration with R. Dézavelle, M. Fischer, A. Guilleux, V. Host, A. Moyse and P. Pérault. Pp. 169. (Besancon: Annales Scientifiques de Franche-Comté, 1948.)

FORTHCOMING EVENTS

*(Meetings marked with an asterisk * are open to the public)*

Tuesday, June 21

CHADWICK PUBLIC LECTURE (at the Royal Society of Tropical Medicine and Hygiene, 26 Portland Place, London, W.1), at 2.30 p.m.—Dr. Sibyl Horner: "Evolution of Industrial Work for Women and Young Persons and its Effect on the National Health".*

ROYAL ANTHROPOLOGICAL INSTITUTE (in the Anatomy Theatre, University College, Gower Street, London, W.C.1), at 5 p.m.—Mr. G. I. G. Worcester: "The Boat in Anthropology".

Tuesday, June 21—Wednesday, July 20

ROYAL ANTHROPOLOGICAL INSTITUTE (at 21 Bedford Square, London, W.C.1), at 10 a.m. each day.—Exhibition of "Traditional Art of the British Colonies".*

Wednesday, June 22

BRITISH PSYCHOLOGICAL SOCIETY, MEDICAL SECTION (at the Medical Society of London, 11 Chandos Street, Cavendish Square, London, W.1), at 8 p.m.—Symposium on "Aggression in Nature and Society". (All members of the Society are invited.)

Thursday, June 23

MINERALOGICAL SOCIETY (at the Geological Society, Burlington House, Piccadilly, London, W.1), at 5 p.m.—Scientific Papers.

APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates mentioned:

AGRICULTURAL ECONOMISTS and ASSISTANT AGRICULTURAL ECONOMISTS (Grade B)—The Registrar, The University, Manchester 13 (July 4).