

are released only under the conditions of the swamp soil. If the nature of these substances can be determined, it may be possible to provide them in comparatively stable forms even under dry soil conditions and thus improve the yield of rice. Intense research in this direction will lead to findings of very great practical value.

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RESEARCH ITEMS.

Boundary Problem in a Non-Linear Partial Differential Equation of the Fourth Order.—Considering the non-linear partial differential equation $\frac{\partial^4 u}{\partial x^4} + \frac{\partial^2 u}{\partial t^2} = p(x, t)u^3$ in the domain $0 \leq x \leq \pi$, $0 \leq t \leq T$, the problem is to find its regular solution $u(x, t)$ satisfying the conditions

$$u(0, t) = u(\pi, t) = 0 \text{ in } 0 \leq t \leq T,$$

$$u(x, 0) = f_1(x), \quad \frac{\partial u}{\partial t}(x, 0) = f_2(x) \text{ in } 0 \leq x \leq \pi.$$

This has been considered by M. R. Siddiqui (*Ind. Physico-Math. J.*, 1937, 8) and it is found that for a restricted T , one and only one solution exists which can be expressed as a Fourier series $u(x, t) = \sum_n v_n(t) \sin nx$, wherein

the coefficients $v_n(t)$ are determined with the help of an infinite system of non-linear integral equations, which is solved by the method of successive approximations.

Amphoteric ion.—A review of considerable interest has recently been published (P. Rumph, 'La Theorie de L'ion Amphotere,' *Actualites Scientifiques et Industrielles*, 1936, No. 374). The review covering just 50 pages is divided into three chapters: (i) the existence of amphoteric ions, (ii) the dielectric constants of aqueous solutions containing amphoteric ions, (iii) calculation of the different dissociation constants and the relationship between the activities of the amphoteric ions and those of the uncharged molecules.

In a brief conclusion, the author draws attention to the usefulness of this concept of amphoteric ions in branches of chemistry other than a pure study of biological substances, such as, in the theory of colouring matters, the constitution of complex compounds of inorganic salts, etc.

Histology of the Skin of *Protopterus*.—The African lung-fish, *Protopterus annectens*, is known

for its powers of aestivation during the dry months of the year, when all physiological activities of the animal are in abeyance. G. M. Smith and C. W. Coates (*Quart. Journ. Micros. Sci.*, March 1937, 79, Pt. III, No. 315) have examined the structure of the skin of the animal during normal life and during aestivation (which they have been able to induce in the laboratory). The difference between the two skins rests mainly in the structure of the mucous glands which are very conspicuous and large in the normal skin while they are shrunk and small in the skin of the aestivating animal. Certain minor changes also occur in the epithelial cells of the skin during aestivation.

Germ-Cell Origin in the Amphibia.—Diversity of opinion, not solely due to differences in interpretation, exists regarding the origin of germ-cells in the adult Amphibia. Whether germ cells that make their appearance periodically during the lifetime of the animal are the derivatives of the original and primordial germ-cells of the embryo or whether they are formed afresh every season, at least in part, of somatic derivatives is the problem. The evidence presented is conflicting. J. W. Burger (*Journ. Morph.*, March 1937, 60, No. 2) working on *Plethodon cinereus* finds the germ-cell line in this animal continuous and that primordial germ-cells alone give rise to the germ-cells of the adult by repeated divisions, themselves remaining unchanged throughout the lifetime of the animal. No somatic cell of any kind is seen to give rise to germ-cells, either by a direct transformation or by division. Both cytological as well as statistical evidence is put forward for this theory in the paper. The findings of Seshachar (*Zeitsch. Zell.*, April 1937, Bd. 26, H. 2) are exactly opposite. In the Cæcilian *Ichthyophis glutinosus*, he finds that practically the only source of the germ-cells in the adult male is the lining of the duct system whose representative vessels ramify throughout the testis and whose cells are constantly seen transforming into spermatogonia. Residual spermatogonia derived from the primordial germ-cells of the embryo and persisting throughout the life of the animal giving rise to functional germ cells, themselves remaining unchanged, are absent in *Ichthyophis*. While it is possible that both kinds of conditions are found in the Amphibia, it is more than likely that the organization of the testis and the pattern of spermatogenesis determine the particular condition found in the animal.

Theileriasis of Cattle in India.—From a study of a strain of *Theileria* in artificially infected hill bulls Sen and Srinivasan (*Ind. J. Vet. Sci. and Animal Husb.*, 1937, 7, 15) have concluded that the incubation period lasts for 16 days in artificial infection but the duration of the disease is only 5.5 days in fatal cases and 4 to 17 days in recovering cases. The disease is characterised by high fever, loss of appetite, enlargement of prescapular and precrural glands and yellow and petichæted condition of the visible mucous membranes. Blood examination at the first rise of temperature shows often rare theileria and Koch's bodies or both. The parasites multiply in the course of the disease and attack 50 to 100% of the red blood cells though Koch's bodies may be few or many. Usually the parasites are seen as round forms, "rods" being rare. The mortality is over 75%.

Twenty different drugs were tried for remedial effects but the results were neither definite nor satisfactory.

The next article which the authors have promised, dealing with immunisation and treatment with Anti-Serum, will be eagerly looked forward to.

S. D. A.

Pneumonia in Foals due to *Corynebacterium equi*.—A particular form of pneumonia is known to occur with some frequency in certain breeding studs in the Punjab, and the etiology of this condition, which was thought to be identical with that described by Magnusson in Sweden, has been under investigation for some time.

The infection is generally confined to foals about one to two months old, and occasionally symptoms of joint-ill may be seen in addition to those of pneumonia. The mortality is high. Post-mortem examination reveals large abscess cavities in the lungs and the mediastinal glands.

Corynebacterium equi, the causal agent, can be recovered in nearly every case in pure culture from the abscesses in the lungs and mediastinal glands, as well as from the faeces, sometimes from the heart-blood and, rarely, from the joint fluid of naturally as well as artificially infected cases. The cultural and biochemical characters of this organism have been newly described (Rajagopalan, *Ind. J. Vet. Sci. and Animal Husb.*, 1937, 7, 38).

It has been possible to reproduce the typical symptoms of the disease by an intra-nasal douche of a saline suspension of the organism. Age, as in natural incidence, appears to be the chief factor in the artificial reproduction of the disease.

S. D. A.