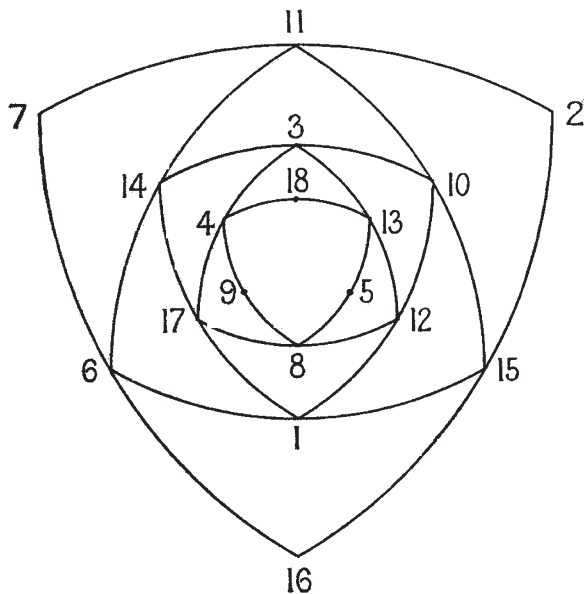


are required who will, without doubt, introduce new ideas and obtain results far transcending those we are in possession of now. The latest work has shown that the method is applicable to boards of triangular and trapezoidal shapes, and also to solid boards in three dimensions, so that the remote ground occupied by magic and Nasik cubes will soon be invaded.

In conclusion, I bring before you an interesting example of magic arrangement that I found whilst engaged in rummaging amongst the books and documents of the old Mathematical Society of Spitalfields (1717-1845) for the purpose of extracting something which might interest or amuse, if it might not instruct, the audience I addressed in Section A of the British Association for the Advancement of Science at Glasgow last autumn. It is an arrangement of the first eighteen numbers on five connected triangles; the magical property consists in the circumstance that the numbers 19, 38 and 57 appear as sums in a variety of ways. The number 19 appears nine times, 38 twelve times and 57 fourteen times (Fig. 15).



$$\begin{aligned}
 9 &= 7+12=14+5=4+1. \\
 &= 6+13=17+2=9+10 \\
 &=16+3=1+18=8+11 \\
 88 &= 7+11+14+6=11+2+15+10=15+16+6+1 \\
 &=11+10+3+14=10+15+1+12=1+6+14+17 \\
 &=14+3+4+17=3+10+12+13=12+1+17+8 \\
 &=3+13+18+4=13+12+8+5=8+17+4+9 \\
 57 &= 7+14+4+5+12+15=6+17+9+13+10+2=16+1+8+18+3+11 \\
 &= 7+11+2+15+16+6=11+10+15+1+6+14=14+3+10+12+1+17 \\
 &= 3+13+12+8+17+4=4+18+13+5+8+9 \\
 &= 9+4+3+10+15+16=18+13+12+1+6+7=5+8+17+14+11+2 \\
 &= 9+8+12+10+11+7=18+4+17+1+15+2=5+13+3+14+6+16
 \end{aligned}$$

FIG. 15.

I should say that I feel conscious that I have not been able to introduce the subject of my lecture without occasional and, perhaps, in the circumstances, unavoidable obscurity. For the rest, I have felt somewhat doubtful as to the interest I might arouse in these problems, but the managers honoured me by inviting me to display to you some of the chips from a pure mathematician's workshop, and I felt no hesitation in accepting.

FORTHCOMING BOOKS OF SCIENCE.

Mr. Felix Alcan (Paris) promises:—"Les Bases scientifiques de l'Éducation physique," by Démeny; "Les Grands Phénomènes géologiques," by Prof. S. Meunier; "Manuel d'Electrothérapie," by A. Weill; "Traité d'Intubation du Larynx," by Bonain; "Manuel d'Histologie pathologique," tome ii., by MM. Durante, Dominici, &c.

Mr. Edward Arnold gives notice of:—"Elementary Princi-

ples in Statistical Mechanics, by Dr. J. W. Gibbs, and "The Elements of Experimental Phonetics," by Dr. E. W. Scripture.

Messrs. G. Bell and Sons announce:—"Comparative Anatomy of Animals, an Introduction to the Study of," by Dr. G. C. Bourne, vol. ii.:—"The Coelomata, illustrated;" "Elementary General Science," by D. E. Jones and Dr. D. S. Macnair; "Injurious and Useful Insects," by Prof. L. C. Miall, F.R.S., illustrated; "Physiography," by H. N. Dickson; "Electricity and Magnetism," by Dr. Oliver J. Lodge, F.R.S.; "Light," by A. E. Tutton, F.R.S.

Messrs. A. and C. Black promise:—"Problems in Astrophysics," by Agnes M. Clerke, and a new edition of the same writer's "History of Astronomy during the Nineteenth Century."

The announcements of the Cambridge University Press include:—"Catalogue of Scientific Papers," compiled by the Royal Society, vol. xii., supplementary volume; "Scientific Papers," by John William Strutt, Baron Rayleigh, F.R.S., vol. iv.; "Theory of Differential Equations," by Prof. A. R. Forsyth, F.R.S., part iii.:—"Ordinary Linear Equations;" "Mathematical Analysis," by E. T. Whittaker; "The Algebra of Invariants," by J. H. Grace and A. Young; "Electric Waves, being an Adams Prize Essay in the University of Cambridge," by H. M. Macdonald, F.R.S.; "A Treatise on Determinants," by R. F. Scott, a new edition by G. B. Mathews, F.R.S.; "The Electrical Properties of Gases," by Prof. J. J. Thomson, F.R.S.; "A Treatise on Spherical Astronomy," by Sir Robert S. Ball, F.R.S.; "Fossil Plants, a Manual for Students of Botany and Geology," by A. C. Seward, F.R.S., vol. ii.; "A Primer of Botany," by F. F. Blackman; "A Primer of Geology," by J. E. Marr, F.R.S.; "Immunity in Infectious Diseases," by Prof. É. Metchnikoff, authorised English translation by F. G. Binnie, illustrated; "Index Nominum Animalium," compiled by C. D. Sherborn under the supervision of a Committee appointed by the British Association and with the support of the British Association, the Royal Society and the Zoological Society, vol. i. (1758-1800); "Zoological Results based on Material from New Britain, New Guinea, Loyalty Islands and elsewhere, collected during the years 1895, 1896 and 1897," by Dr. A. Willey, part vii. Conclusion; "Reports of the Anthropological Expedition to Torres Straits by the members of the Expedition," edited by Dr. A. C. Haddon, F.R.S. (it is expected that the work will be completed in five volumes); "Fauna Hawaiiensis, or the Zoology of the Sandwich Islands: being results of the Explorations instituted by the Joint Committee appointed by the Royal Society of London for promoting Natural Knowledge and the British Association for the Advancement of Science, and carried on with the assistance of those bodies and of the Trustees of the Bernice Pauahi Bishop Museum," edited by Dr. D. Sharp, F.R.S.; "The Fauna and Geography of the Maldive and Laccadive Archipelagoes: being the Account of the Work carried on and of the Collections made by an Expedition during the years 1899 and 1900 under the Leadership of J. S. Gardiner," vol. ii. part ii.; "The Geographical Distribution of Diseases," by Dr. F. G. Clemow; "An Introduction to Logic," by W. E. Johnson; "Euclid, Books i.-iii., with Simple Exercises," by R. T. Wright; "An Introduction to Physiography," by W. N. Shaw, F.R.S.; "A Brief History of Geographical Discovery since 1400," by Dr. F. H. H. Guillemard; and a new edition of "Solution and Electrolysis," by W. C. D. Whetham.

Messrs. Cassell and Co., Ltd., give notice of:—"The Ascent of Aconcagua," by Sir W. M. Conway, illustrated; Cassell's "Cyclopædia of Mechanics," edited by P. N. Hasluck, second series, illustrated; "The Automobile: its Construction and Management," translated from Gerard Lavergne's "Manuel Théorique et Pratique de l'Automobile sur Route," revised and edited by P. N. Hasluck, illustrated.

Messrs. W. and R. Chambers, Ltd., call attention to:—"The Nineteenth Century Series," containing "Medicine, Surgery, and Hygiene in the Century," by Dr. E. H. Stafford; "Progress of India, Japan, and China in the Century," by the Right Hon. Sir R. Temple, Bart., F.R.S.; "Progress of the United States of America in the Century," by Prof. W. P. Trent; "Progress of British Empire in the Century," by J. S. Little; "Progress of Canada in the Century," by J. C. Hopkins; "Progress of Australasia in the Century," by T. A. Coghlan and T. T. Ewing; "Progress of New Zealand in the Century," "Discoveries and Explorations of the Century," by Prof. C. G. D. Roberts; "Economic and Industrial Progress of the Century," by Dr. H. de B. Gibbins; "Inventions of the Century," by

W. H. Doolittle; "Naval Development of the Century," by Sir N. Barnaby; "Progress of Education in the Century," by J. L. Hughes and Dr. L. R. Klemm; "Progress of Science in the Century," by Prof. J. A. Thomson.

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In the list of books in preparation at the Clarendon Press is the following:—Schimper's "Geography of Plants," authorised translation, by Profs. P. Groom and W. R. Fisher.

In the list of Messrs. A. Constable and Co., Ltd., we notice:—"The Prevention of Disease," by Drs. Bing, Einhorn, Fischl, Flatau and others, translated.

Messrs. Duckworth and Co. have in preparation:—"The Fungus Flora of Europe," by G. Mousse.

The list of Mr. W. Engelmann (Leipzig) contains:—"Die Assanierung von Wien," edited by Dr. Th. Weyl, illustrated; "Lehrbuch der Qualitativen Analyse," by Dr. W. Böttger, illustrated, by Profs. P. Groom and W. R. Fisher. "Die Eisenkonstruktionen der Ingenieur-Hochbauten," by Prof. M. Foerster; "Über Ähnlichkeiten im Pflanzenreiche," by Prof. F. Hildebrand; "Catalogus Dipterorum," by Dr. C. Kertész, vol. i.; "Die Entwicklung des Gesichtes," by Prof. C. Rabl, i. heft, illustrated; "Chemisches Praktikum," by Dr. A. Wolfrum.

Messrs. R. A. Everett and Co. promise:—"The Care of Old Age," by Dr. D. Walsh.

Mr. Gustav Fischer (Jena) gives notice of:—"Handbuch der Pathogenen Mikro-organismen," edited by Profs. W. Kolle and A. Wassermann, part i., illustrated; "Paläontologie und Descendenzlehre," by Prof. E. Koken; and "Tabellen zur Gesteinskunde," by Prof. G. Linck, illustrated.

The announcements of Messrs. Charles Griffin and Co., Ltd., include:—"Trades' Waste: its Treatment and Utilisation, with Special Reference to the Prevention of Rivers' Pollution," by W. Naylor, illustrated; "Physico-Chemical Tables for the Use of Analysts, Physicists, Chemical Manufacturers, and Scientific Chemists," by J. Castell-Evans, vol. i.:—Chemical Engineering, Physical Chemistry; vol. ii.:—Chemical Physics, Pure and Analytical Chemistry; "Elementary Coal-Mining: for the Use of Students, Miners, and others preparing for Examinations," by G. L. Kerr, illustrated; "Students' Handbook on Paints, Colours, and Varnishes," by G. H. Hurst, illustrated; "A Text-Book of Physics," by Profs. J. H. Poynting, F.R.S., and J. J. Thomson, F.R.S., in 5 volumes, illustrated, volumes on the Properties of Matter, Heat, Light, Magnetism and Electricity; "Gold Seeking in South Africa: a Handbook of Hints for intending Explorers, Prospectors, and Settlers," by T. Kassner, illustrated; "The Metallurgy of Steel," by F. W. Harbord, illustrated; "Diseases of the Organs of Respiration: a Treatise of the Etiology, Pathology, Symptoms, Diagnosis, and Treatment of Diseases of the Lungs and Air Passages," by Dr. S. West, 2 vols., illustrated; "The Work of the Digestive Glands," by Prof. Pawlow (the Nobel Prize Researches in Physiology, 1901), translated by Dr. W. H. Thompson; "Hygiene and Public Health," by Dr. H. W. G. Macleod, illustrated.

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Messrs. P. S. King and Son call attention to:—"Sewage Works Analyses," by G. J. Fowler, illustrated; "The Sanitary Inspector's Guide," by H. Lemmoin-Cannon, and a new edition of "Elements of Statistics," by A. L. Bowley.

Mr. John Lane has in hand for appearance in his "Handbooks of Practical Gardening":—"The Book of Vegetables," by G. Wythes; "The Book of the Strawberry," by E. Beckett; and "The Book of Orchids," by W. H. White.

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Assayers," by E. L. Rhead and Prof. A. H. Sexton; "Calculations in Hydraulic Engineering, a Practical Text-Book for the Use of Students, Draughtsmen, and Engineers," by Prof. T. C. Fidler; "Part II. Calculations in Hydro-Kinetics," illustrated; "A Manual of Surgical Treatment," by Prof. W. W. Cheyne, F.R.S., and Dr. F. F. Burghard, in 6 parts: part vi., sections 1 and 2.

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Mr. Fisher Unwin gives notice of:—"Indonesian Art. Selected Specimens of Ancient and Modern Art and Handiwork from the Indian Archipelago," by C. M. Pleyte, illustrated; and "Sand-Buried Cities in Turkestan," by M. A. Stein.

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UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Prof. Tylor has resigned the office of keeper of the University Museum, which he has held since the death of Prof. Henry Smith in 1883. He will retain his leadership in anthropology. Prof. Tylor's magnificent gifts of totemistic objects to the Museum will remain as tokens of the great interest which he has taken in the welfare of the institution with which his more immediate connection will now cease.

At a meeting of the Junior Scientific Club on Wednesday, March 5, papers were read by Mr. H. D. Davis (Balliol) on snake poisons, and by Mr. J. Phelps (Trinity) on the boiling points of solutions.

CAMBRIDGE.—Mr. T. H. Havelock, of St. John's College, has been elected to the Isaac Newton studentship in physical astronomy. Mr. Havelock and Mr. J. E. Wright (senior wrangler 1900), of Trinity, are the Smith's prizemen of the year.

The Allen studentship is awarded to Mr. F. N. Hales, Trinity, for research in psychophysics.

The Balfour studentship in animal morphology is awarded to Mr. J. S. Budgett, Trinity.

The General Board of Studies propose to re-establish the

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office of assistant to the superintendent of the Museum of Zoology with a view to the arrangement of the collections.

MR. R. A. S. REDMAYNE has been appointed professor of mining in the University of Birmingham, and Mr. Thomas Turner professor of metallurgy. Mr. Redmayne is resident manager of the Seaton Delaval Collieries in Northumberland, and Mr. Turner has for several years been director of technical instruction to the Staffordshire County Council.

THE sum of 25,000*l.* has been given by Mr. William Johnston, shipowner of Liverpool, for furthering the university movement in that city. The money will be devoted, in accordance with the wishes of the donor, to promote research in pathology and physiology. The 25,000*l.* is divided as follows:—10,000*l.* is allocated to found a chair of chemical biology, 6000*l.* at 5 per cent. interest to endow permanently three research fellowships of 100*l.* a year each. Of these fellowships one is held by a medical graduate of a colonial university, a second by a graduate of medicine of the United States, and a third by a research student in gynaecology. The remaining 9000*l.* is to be spent in building a laboratory adjoining the Thompson Yates laboratories, to accommodate the tropical school, the professor of chemical biology, experimental medicine, comparative pathology, and serum research department.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 6.—"The Density and Coefficient of Cubical Expansion of Ice." By J. H. Vincent, D.Sc., B.A., St. John's College, Cambridge. Communicated by Prof. J. J. Thomson, F.R.S.

February 20.—"Note on the Anomalous Dispersion of Sodium Vapour." By W. H. Julius, Professor of Physics in the University of Utrecht. Communicated by C. Vernon Boys, F.R.S.

"On the Physics and Physiology of the Protoplasmic Streaming in Plants." By Alfred J. Ewart, B.Sc. (Oxon), D.Sc. (Lond.), Ph.D., F.L.S., Lecturer on Botany in the Birmingham Technical Institute. Communicated by Francis Gotch, D.Sc., F.R.S.

February 27.—"Note on the Discovery of a New Trypanosoma." By D. Bruce, F.R.S., Lieut.-Colonel., R.A.M.C.

The author received from South Africa specimens of blood taken from cattle which contain a new species of Trypanosoma.

This new species can be at once distinguished from the Trypanosomas of Surra, tse-tse fly disease, or rat by its larger size, it being almost twice as large as any of the others. In general appearance it conforms closely to the others in possessing an oval protoplasmic body, a longitudinal fin-like membrane, and a single flagellum.

This new Trypanosoma was lately discovered by Dr. A. Theiler, who is in charge of the bacteriological laboratory of the Medical Officer of Health, Pretoria, Transvaal.

He states that at first he was under the impression that he had merely hit against the familiar Trypanosoma of tse-tse fly disease. He, however, was struck by its larger size, and tried a few inoculation experiments. He found that the new Trypanosoma only infects cattle. Horses, dogs, goats, rabbits and guinea-pigs are all immune, neither showing symptoms nor the presence of the parasites in the blood. With the same blood he infected two calves, which showed distinct febrile reaction, and at the same time the parasites appeared in the blood.

He found the parasite for the first time in the blood of a young ox which had just recovered from an attack of rinderpest, and since then has successfully inoculated calves from two other cattle.

He describes the disease as an acute pernicious anæmia with grave blood changes, a general anæmia without deformation of the elements of the blood, or, lastly, only a slight fever, and that there exists a natural immunity in cattle against this Trypanosoma.

He is of opinion that this disease is the same as that attributed by Dr. Kolle—who studied rinderpest in South Africa with Koch during the last outbreak—to bovine malaria. Dr. Kolle overlooked the Trypanosoma, saw that the disease was infectious, and thought he observed endoglobular parasites and pigment in the red blood corpuscles.

As this discovery seems to be an interesting one, and as