vania and West Virginia entirely from the western sea; in these deposits no marine fossils are found, but only land plants and fresh-water Crustaceans and a few fresh-water mollusks."

A table showing the correlation of the Coal Measures of Arkansas and similar deposits in Indian Territory, Texas, the Mississippi Valley, Pennsylvania, China and other parts of Asia, Russia and the Ural Mountains, India and South America, closes what may be termed the first part of this contribution. The remainder, pages 25–72, consists of an annotated list of the Marine Fossils of the Arkansas Coal Measures, together with a check list showing their stratigraphic distribution and the localities of their occurrence in Arkansas and elsewhere. Nine excellent plates accompany the text. A new species of *Gastrioceras*, *G. branneri*, and a variety of *Pronorites cyclobolus*, Phillips, called *arkansiensis*, are described. A description of the trilobite *Phillipsia* (*griffithides*) *ornatea*, by Capt. A. W. Vogdes, U. S. A., quoted from the Proceedings of the California Academy of Science,[*] is also inserted.

By those interested in the organic side of geology Professor Smith's paper will be read with much satisfaction. The comparative study of faunas, their relations and distribution, is a line of investigation which promises much in the near future.

FREDERIC W. SIMONDS.

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Clay Deposits of Missouri. By H. A. WHEELER. Missouri Geological Survey, Vol. XI., 622 pp., 39 pl. Jefferson City, 1896.

The recent report upon the Missouri clays, while essentially economic in character, discusses a number of problems of wide scientific interest. Among these the nature of plasticity as exemplified in clays is perhaps the most important. Professor Wheeler finds, as a result of physical tests and the microscopic examinations of Haworth, that the fine plate theory of Johnson and Blake[†] is the only one which satisfactorily explains the facts, and that fineness in itself has no real bearing on the plasticity.

It is found that the fusibility of a clay is a function not only of the chemical composition, but of the fineness of grain and the density. The following formula is developed and thought to be satisfactory for approximate results, but it is held that absolute results can only be obtained by testing.

$$FF=\frac{N}{D+D'+C}$$

In this FF represents the numerical value of refractoriness. N represents the sum of the non-detrimental constituents, or the total silica, alumina, titanic acid, water, moisture and carbonic acid. D represents the sum of the fluxing impurities or the alkalies, oxide of iron, lime and magnesia. D' represents the sum of the alkalies, which are estimated to have double the fluxing value of the other detrimentals, and hence are added twice. C has the following values:

$C=1$,	clay	coarse	grained	sp.	gr.	over 2.00
$C=2$,	"	"	"	"	"	2.00 — 2.25
$C=3$,	"	"	"	"	"	1.75 — 2.00
$C=2$,	"	fine	"	"	"	over 2.25
$C=3$,	"	"	"	"	"	2.00 — 2.25
$C=4$,	"	"	"	"	"	1.75 — 2.25

There are a large number of physical tests, chemical analyses and detailed descriptions of processes, and the work is one of wide interest and considerable value.

H. FOSTER BAIN.

SCIENTIFIC JOURNALS.

AMERICAN CHEMICAL JOURNAL, MAY.

On Urethanes: By O. FOLIN. When sodium methylate is treated with acetbromamide the yield is not, as might be expected, a hydroxylamine derivative, but a urethane which is formed by a molecular rearrangement during the course of the reaction. The purpose of the author was to test this reaction, to find out if it was general and also the effect of different negative and positive groups substituted in the bromamide. As a result of a number of experiments with different radicals, it was found that the difference in the nature of the radical did not affect the reaction, which is a general one that can be used in the preparation of urethanes. The urethanes when treated with phosphorus penta-

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[*] Second Series, Vol. IV., p. 589 *et seq.*

[†] *Am. Jour. Sci.* (2), XLIII., p. 357. 1867.

chloride yield chlorformanilides, thus offering a simple and easy method for preparing these substances. When free urethane is treated with phosphorus pentachloride a more complex reaction takes place, a carbamide chloride being formed. When urethane and phosgene are brought together, three different reactions take place, depending to some extent upon the relative amounts of the substances present.

Action of Phosphorus Pentachloride on Aniline and its Salts: By J. Elliott Gilpin. The author has obtained several products by the substitution of one or more chlorine atoms of the phosphorus pentachloride by residues of aniline. When aniline hydrochloride and phosphorus pentachloride are heated together a volatile compound having the composition $PCl_3\ (NC_6H_5)$ is formed. This is unstable and readily decomposed by water. A product, obtained by treating the aniline with phosphorus pentachloride, $PCl\ (NHc_6H_5)_4$ is, on the other hand, extremely stable, resisting, in general, all except the most energetic reagents. Derivatives of this substance cannot be obtained readily, if at all, as it is completely decomposed if any action takes place. When heated it forms a black substance, containing probably carbon and phosphorus, which is remarkable for its stability. Compounds analogous to the one formed from aniline can be obtained from the toluidenes.

On the Preparation of Metabrombenzoic Acid and of Metabromnitrobenzene: By H. L. Wheeler and B. W. McFarland. The most general method that has been used for the preparation of these compounds consisted in heating the benzene compound with bromine or ferrous bromide in a sealed tube for several days. The authors find that the reactions can be performed in an open vessel and in a short time by using iron as a bromine carrier. This is even better than already prepared ferrous bromide. The substance is warmed with iron wire, and bromine is added slowly until the action is complete. The method was tested in a number of cases and proved to be one of general applicability.

On the Non-existence of Four Methenylphenylparatolylamidenes: By H. L. Wheeler. In an article published recently Walther describes the preparation of this substance by four different methods. Each method, according to him, gives a new amidine, and he supposes them to be isomers. The author of this paper has repeated the work, as the results obtained by Walther are not in harmony with the generally accepted behavior of amidines, and finds that the products obtained by the first and second methods are mixtures, while the third and fourth methods yield one and the same product, thus showing that instead of four only one amidine was obtained.

South American Petroleum: By C. F. Mabery and A. S. Kittelberger. In the present paper Professor Mabery contributes further results obtained in his investigations on petroleum. This oil was obtained in South America and differs in some ways very much from the product obtained in this country. The methods hitherto used for isolating the products failed in some cases, and the exact nature of the products could not be determined. The investigation showed, however, that the hydrocarbons present consisted of a series containing less hydrogen than $C_n\ H_{2n+2}$ and more than $C_n\ H_{2n-6}$ with perhaps a trace of these.

The Action of Certain Alcohols on Asymmetadiazoxylenesulphonic Acid: By W. B. Shober and H. E. Kiefer. The action of this diazo compound with methyl, ethyl and propyl alcohols was studied, and in each case two amides, one the xylenesulphon amide, and the other the amide of the xylenesulphonic acid of the alcohol, were obtained, whether the reaction was carried on at ordinary temperatures or under pressure. The methoxyxylenesulphonic acid and its salts were made and studied, as were also those of the propyl acid. By the oxidation of Asymmetamethoxyxylenesulphonamide they obtained methoxysulphaminetolnic acid and from it prepared its salts.

The Action of Ethylic Oxalata on Camphor: By J. B. Tingle. Several structural formulæ have been assigned to camphor, and in all of these the presence of the group $CH_2\ CO$ is recognized. In the study of the related bodies, the diketones and keto-acids, the compounds chiefly investigated have contained strongly negative groups; but in the present investigation the author has used substances only feeble in this respect, in hopes of throwing some light on this class of bodies. The results obtained, however, do not warrant any strong assumptions either way. He prepared ethylic camphoroxalate and the free acid, and from a study of their behavior as compared with the compounds studied by others he drew some conclusions as to their probable structure.

Preparation of Zinc Ethyl: By A. LACHMAN. The author has improved the method for the preparation of zinc alkyls, in which the copper-zinc couple is used. The difficulties met with in working according to the former directions are avoided by mixing zinc dust and copper oxide and heating in a glass tube in a current of hydrogen. In this way an excellent alloy is obtained. Some suggestions are given as to the preservation and use of the zinc alkyl.

A Simple Test for the Halogens in Organic Halides: By J. H. KASTLE and W. A. BEATTY. The authors have devised a simple method of testing for the presence of the halogens in organic compounds. The substance, if not volatile, is heated with a mixture of silver and copper nitrates. The product is treated with dilute sulphuric acid and zinc, to reduce any halogen compound of silver, then filtered and tested with silver nitrate. If the substance is volatile it is heated in an S-shaped tube, the nitrates being placed in the bend beyond the substance and the two heated alternately, so that the volatile substance is distilled into the nitrates. The method was found applicable to all classes of compounds.

The following books are reviewed in this number of the *Journal*: Commercial Organic Analysis, A. H. Allen, Vol. III., Pt. III.; Engineering Chemistry, T. B. Stillman; Ptomaïns, Leucomaïns, Toxins and Antitoxins, V. C. Vaughan; A Laboratory Manual of Inorganic Chemistry, R. P. Williams; Laboratory Calculations and Specific Gravity Tables, J. S. Adriance.

J. ELLIOTT GILPIN.

THE AMERICAN GEOLOGIST, MAY.

'CHANGES of Level in the Bermuda Islands,' by Ralph S. Tarr. The conclusions of previous observers are reviewed and some new facts presented. The results, as based upon all the investigations yet made, show that the Bermudas are underlain by a base rock of shell and coral fragments formed by wave action. This shell sand beach was then consolidated into a dense limestone and suffered some aërial erosion, and was finally depressed and attacked by the waves. In the last stage it was partly covered by beach deposits of pebbles and shells. Then came an uplift of 40 or 50 feet during which land shells lived on the beach deposits. Accumulations of blown sand were made and the outline of the Bermuda hills perfected by the action of the winds. Since then there has been a depression causing much land to disappear and the outline of the area to become very irregular.

James P. Kimball completes his examination of the 'Physiographic Geology of the Puget Sound Basin.' It describes the following chief historic events. The deposition of the Tejon strata of the Eocene, their subsequent disturbance, followed by denudation, reaching base-level during the glacial period. Glacial drift was accumulated in the axial part of the basin. Later alternations of level brought about fluvial erosion of the drift mantle, then submergence below sea level flooded the lower valleys, producing the present type of inlets and sounds. In recent times partial emergence has taken place.

E. W. Claypole describes a large Dinichthys, considered as belonging to a new species.

'On the Genesis of Clay Stones,' by H. W. Nichols. Claystones are regarded as crystalline aggregates whose growth has been modified by the large amount of foreign matter (clay) present, and the conditions of their formation are the same as those which would, in more favorable positions, lead to the formation of an aggregate of calcite crystals of the more usual form. There are two conditions which appear favorable to the formation of concretions: (1) the presence of arragonite with the disseminated calcite of the clay beds, and (2) the presence of unstable humus acids. The more soluble arragonite continuously goes into solution, thereby over-saturating it with respect to calcite, upon the particles of which the calcium carbonate of the solution is deposited. Thus the calcite grows as the arragonite diminishes.

'Nomenclature of the Galena and Maquoketa

Series,' by F. W. Sardeson. A supplementary discussion to the papers by the same author on these formations, showing the confusion arising from a shifting nomenclature.

N. H. Winchell gives a partial bibliography with notes on 'The Age of the Great Lakes of North America.' It is interesting to have the various opinions thus summarized for reference. The prevailing belief has been that these lakes occupy preglacial valleys which have been shut off by earth movements and by glacial accumulations.

Warren Upham discusses the 'Relation of the Lafayette or Ozarkian Uplift of North America to Glaciation.' Both are referred to the Quaternary.

SOCIETIES AND ACADEMIES.

THE 95TH REGULAR MEETING OF THE CHEMICAL SOCIETY OF WASHINGTON, APRIL 8, 1897.

The first paper, 'Three Early American Chemical Societies,' was read by Dr. H. Carrington Bolton.

The first Chemical Society ever organized in either hemisphere was founded at Philadelphia in 1772, forty-nine years before the Chemical Society of London, the oldest in Europe. The President was Dr. James Woodhouse, professor of chemistry in the medical department of the University of Pennsylvania, and the first Vice-President was Felix Pascalis Ouvrière, a naturalist born in France and sometime a resident of Santo Domingo. On December 10, 1801, Robert Hare presented to the Chemical Society of Philadelphia his memorable paper on the 'Hydrostatic Blow-pipe,' which was published by the Society in the following year as a pamphlet with the title: 'Memoir on the Supply and Application of the Blow-pipe.'

In 1811 a second Chemical Society was founded in Philadelphia called the 'Columbian,' under the presidency of Professor James Cutbush. The constitution of this Society provided for levying fines on absent members and those who refused to accept office when elected. The Society numbered sixty-nine members, of which thirty-one were foreign chemists, and thirteen junior members; these included the most prominent chemists and philosophers living on both sides of the Atlantic. In 1815 The Columbian Chemical Society of Philadelphia published one volume of memoirs; this contained twenty-six essays on a variety of topics original, speculative and practical.

The third Chemical Society was the Delaware Chemical and Geological Society, organized at Delhi, New York, in 1821; it was, however, short lived and issued no publications.

Dr. Bolton's essay contained brief biographical sketches of the prominent members of these early Societies.

The second paper, on 'The Experimental Determination of the Hydrothermal Value of a Bomb Calorimeter,' was read by H. W. Wiley and W. D. Bigelow. The methods previously suggested by other authors for this purpose were reviewed and their advantages and disadvantages discussed. The authors employed a relatively large body of warm water, instead of a very small portion, as had previously been used. Two Beckmann thermometers were employed, which made it possible to read a temperature to a thousandth of a degree, so that the error which would otherwise arise from the slight change of temperature was overcome by the accuracy in reading.

The last paper, on 'The Influence of Vegetable Mold on the Nitrogenous Content of Oats,' was read by Dr. Wiley. Attention having been called several years ago to the large increase in the nitrogen in sugar cane grown in the muck soils of Florida, an investigation was instituted by the Department of Agriculture, in 1894, to determine in what way the humus of such soils influenced the nitrogen contents of cereal crops. The first year's investigation was preliminary, but it showed distinctly that oats grown on soils rich in vegetable mold contained a larger percentage of nitrogen than that grown in other soils. The total increase is, in general, about 25%. This was not in the grain alone, but also in the straw. The second year's investigation verified this result. The increase was largely in amid nitrogen, the percentage of proteids not being greatly increased. The results are, therefore, not so interesting from an economic point of view. When it is remembered that these vegetable soils are extremely rich in nitrogen,