cident, that there were a number of substances, notably quinoline, which convert amorphous selenium into the more stable, black, metallic modification. It is probable that similar results could be obtained with other elements. Kastle has shown that the rate of change of yellow mercuric iodide into the red form varies enormously with the nature of the solvent. The first thing that we need is a systematic study of the allotropic forms of the elements, considering reaction velocity as well as equilibrium. We next take up cases where the change from one form to another can be made increasingly difficult. The three disubstituted benzene compounds, as I have already said, are to be considered as different modifications, only one of which can be stable as solid phase at any given temperature and under atmospheric pressure. According to the text-books *o*-phenol sulphonic acid changes readily into *p*-phenol sulphonic acid on heating. When bromine acts on phenol in the cold, *p*-bromphenol is formed, while *o*-bromphenol is formed when the reaction takes place at 180°. I have not been able to find any record of the *p*-brom compound changing into the *o*-brom compound on heating; but the experiment is worth trying. When we come to the three dibrombenzenes, we have a case where we know that the three forms are identical in composition and where there is certainly some sort of an equilibrium at the time of formation because the relative amounts of the modifications can be changed by varying the conditions of preparation. In spite of all this we know no way of converting two of these compounds directly into the third. We could undoubtedly do it if we could raise the temperature high enough, just as we could also convert the elements. It is as yet impossible to attain the temperature at which the elements change rapidly, while secondary reactions interfere in the case of the organic compounds. So long as we can not change the two less stable forms of any disubstituted benzene compound into the most stable form, there is no reason why we should expect to succeed in what may, perhaps, be the impossible task of simplifying the elements.

Summing up, the future developments in physical chemistry will comprise a theory of concentrated solutions, further applications of the phase rule and of the theorem of Le Chatelier, a systematic study of organic chemistry, and a theory of catalysis.

WILDER D. BANCROFT.

REPORTS OF COMMITTEES.

THE following reports of committees were presented to the council. They were accepted and ordered printed:

On the International Congress of Americanists.

The International Congress of Americanists held its fourteenth biennial meeting in Stuttgart, Germany, August 18–23, 1904. On June 1, 1904, I received a communication from you announcing my appointment as the representative of the American Association for the Advancement of Science at this meeting. The designation was gladly accepted, as it had already been arranged that I should attend the congress on behalf of the Smithsonian Institution.

I now have the honor to report that the meeting was in every way a most gratifying success and that the representation of the American Association was duly recognized and published in the official bulletins of the congress. The attendance was largely German, but representatives from a dozen other countries were present and took an active part in the proceedings. The papers presented related almost exclusively to American history and anthropology and especially to South American subjects. The Germans as well as the French have given very great attention to investigations on that continent.

The next meeting of the congress is to be held at Quebec in August, 1906.

Very respectfully,

W. H. HOLMES.

On Anthropometry.

The committee beg to report that individually and as a committee they have been carrying on

anthropometric work during the past year. It was not feasible to arrange an anthropometric laboratory last year at St. Louis, but this year excellent arrangements have been made in connection with the psychological laboratory of the University of Pennsylvania. Measurements of the members of the association are being made by Messrs. V. A. C. Henmon, F. Bruner and G. C. Fracker, with the cooperation of Professor Thorndike, Dr. Woodworth and members of the committee. The chairman of the committee is making an extended study of American men of science; two papers have been published on the subject and there is now in press a 'Biographical Directory of American Men of Science,' containing much material that can be used. We may call special attention to the Anthropometric and Psychometric Laboratory of the Louisiana Purchase Exposition, arranged by Dr. McGee, head of the Department of Anthropology. The laboratory, under the direction of Dr. Woodworth, assisted by Mr. Bruner, made measurements of about 1,000 representatives of different races, especial attention being paid to the native races of the Philippine Islands.

We ask that the committee be continued and that an appropriation of fifty dollars be made for the expenses of an anthropometric laboratory at the next meeting of the association.

J. McKeen Cattell,
Chairman.

On the Atomic Weight of Thorium.

The work on the 'Complexity of Thorium' by Chas. Baskerville and R. O. E. Davis, referred to in our last report, has been repeated, verified and extended by Fritz Zerban. The investigation was prosecuted partly in the laboratory of the University of North Carolina and is continuing in the College of the City of New York. Larger amounts of the pure thorium compounds have been fractioned. Baskerville and Zerban are at present busied with removing entirely from the new thorium the contaminating constituents preliminary to a determination of its physical constants. Coincident with this work they are studying the properties of the novel impurities, which have been designated 'carolinium' and 'berzelium.' The research is being aided by the Carnegie Institution.

Concerning the second problem assigned your committee for supervision, namely, the work of præseodymium, it would make the following report: Baskerville and G. MacNider did not succeed in proving the complexity of that constituent of the old didymium. The methods of attack were: (1) Production of higher oxides by fusion with sodium dioxide; (2) fractional solution of the well known black oxide in hydrochloric acid at variable temperatures; and (3) fractional precipitation of the oxalate at different temperatures —zero, 20°, and 100° C. A Zeiss comparison spectrometer, purchased by a grant from the council, was used for controlling the progress of the work, which will be continued.

We, therefore, beg leave to report progress.

Respectfully submitted,
Chas. Baskerville,
Capt. Sins Honz,
F. P. Venable.

On Cave Fauna.

Owing to the absence of the secretary of your committee in the caves of Cuba during the last meeting of the association, a report on progress was omitted at the St. Louis meeting.

Since the last report the following papers based in part at least on material collected with the grant of three years ago have been published:

1. 'Report on the Fresh-water Fishes at Western Cuba.' *Bull. U. S. Fish Comm.* for 1902, 211–136.

2. 'The Water Supply of Havana, Cuba,' Science, N. S., XVII., 281–282.

3. 'The Eyes of *Typhlops lumbricalis*, a Blind Snake from Cuba.' *Biol. Bull.*, V., 261–270, by Mrs. E. F. Muhse.

4. 'The Ovarian Structures of the Viviparous Blind Fishes *Lucifuga* and *Stygicola*.' *Biol. Bull.*, VI., 31–54, by H. H. Lane.

5. 'The History of the Eye of *Amblyopsis* from the Beginning of its Development to its Integration in Old Age.' Mark Anniversary Volume, 167–204.

6. 'Divergence and Convergence in Fishes.' In the press of the *Biol. Bull.*

Number five is the most important of these and gives a complete account of the eyes of the largest of our blind fishes. Further work on this form should consist in noting the changes of the eyes in individuals reared in the light.

Several papers are in preparation.

Several years ago a Mr. Donaldson died in Scotland, owner of a farm of somewhat over 182 acres of land near Mitchell, Ind. He was apparently without legal heirs. Suit was brought by the state of Indiana to have this farm escheat to the state. The suit was contested by Scottish heirs of Mr. Donaldson, but was won by the state. This farm is in the midst of the cave region of the

Ohio Valley, to which belong Wyandotte and Mammoth caves, and is much more ideally adapted for experimental work with cave animals than either of the larger caves. On it are easily accessible some very large rooms provided with water. On it are the only entrances to an underground stream which I have followed over a mile by actual measurement and from which all of my material of *Amblyopsis* was obtained. Finally on it the stream comes to the surface under conditions that make the farm admirably adapted for surface ponds and pools to rear cave animals in the light.

The American Association at its Washington meeting passed resolutions asking the state of Indiana to set this aside for a state reservation, and part of it for an experimental farm for the investigation of cave animals, etc. In the winter of 1902 the state legislature passed a bill in part as follows:

"The title of all such lands shall be and remain in the state of Indiana, and such lands shall be devoted to educational purposes.

"The control and management of all such lands shall be vested in the trustees of Indiana University and such lands may be used by said trustees for any proper educational purposes.

"Said board of trustees may in its discretion set off any portion of such grounds to the use of the state board of forestry or to that of Purdue University, or any other educational or scientific institution of the state."

In the meanwhile the heirs appealed the suit to the supreme court of Indiana which also ruled in favor of the state in August of 1903. The heirs thereupon asked the same supreme court to grant them a new hearing before itself and there the matter has been suspended for over a year. It seems very probable that this farm will ultimately pass into the possession of the Indiana University and can then be used for experimental work with cave animals.

I have personally received a grant from the Carnegie Institution which enabled me to make further attempts to secure the embryological material of the Cuban blind fishes, without, however, being entirely successful in securing this much-desired series of embryos.

The most notable and systematic piece of cave work so far undertaken is in preparation by my assistant, Mr. A. M. Banta. He is making a physical and biological survey of Mayfield's cave, situated but five miles from my laboratory. He has determined the distribution of animals in the cave, the per cents. of the total cave fauna that is accidental, occasional or permanent. He is working in the interrelation of these forms and determining the modifications of the permanent members of the fauna to adapt them to cave life. This piece of work will form a base line for future work with the fauna of caves, and it is very desirable that Mr. Banta be enabled to make similar studies of a few selected caves in the various cave regions of America.

It is recommended that the committee be continued and that an appropriation of $100 be made to continue the work of the committee.

Respectfully submitted for the committee.

C. H. EIGENMANN, *Secretary*,
THEO. GILL,
S. H. GAGE.

On Indexing Chemical Literature.

The committee on indexing chemical literature, appointed by your body at the Montreal meeting in 1882, respectfully presents to the Chemical Section its twenty-second annual report, covering the eighteen months ending December 1, 1904.

Works Published:

'A Select Bibliography of Chemistry, 1492–1902,' by Henry Carrington Bolton, Second Supplement. Smithsonian Miscellaneous Collections, No. 1440, City of Washington, 1904.

This supplement brings down the literature of chemistry from the close of the year 1897 to the close of the year 1902. The author died while the publication was in press and most of the proof-reading, as well as the preparation of the index, was done by Mr. Axel Moth, of the New York Public Library.

In the *Arbeiten aus dem Kaiserlichen Gesundheitsamt*, volume 21, pages 141 to 155, appears a critical bibliography of sulfur dioxid in wine, by W. Kerp.

Indexes on the literature of gallium and of germanium, by Dr. Philip E. Browning, of New Haven, Conn., have been completed and accepted by the Smithsonian Institution for publication.

An index to the literature of radium and radioactivity has been completed by Dr. Chas. Baskerville and Mr. Geo. F. Kunz, and is expected to appear in a bulletin of the United States Geological Survey, as an appendix to a paper by Mr. Kunz on radium.

An index to the literature of solubilities, 1875–1903, by Mr. Atherton Seidell, of the Bureau of Soils, is now in the hands of the committee.

The index to the literature of glucinum by Professor Chas. E. Parsons, of New Hampshire College, Durham, N. H., has been completed.

As is well known for a number of years such bibliographies as have been recommended by their committee have been accepted by the Smithsonian Institution for publication in its 'Miscellaneous Collections.' It has thus been possible to put into the hands of specialists and others valuable indexes which could not otherwise be rendered accessible.

That it is not deemed possible for the Smithsonian Institution to continue this work appears from the following extracts from correspondence with Mr. S. P. Langley, Secretary of the Institution:

"The institution has found it necessary to discontinue for the present the publication of separate indices to the literature of the various chemical elements.

"The resources of the Smithsonian Institution, as is well known, are limited, and must be distributed over a very considerable variety of interests. When, failing congressional aid, it seemed that the project of the International Catalogue of Scientific Literature could not proceed without the establishment of an American regional bureau, I decided to assume this on the part of the Smithsonian Institution, and the allotment made for this purpose is practically all that can be spared for any current indexing work.

"The various bibliographies to chemical elements and other chemical indexes could not, apparently, have been projected upon a plan that would fall in with this catalogue, since at the time they were begun no one had the catalogue in mind. Accordingly, I find that the earlier ones come down to 1887, 1893, 1896 and 1900, and a more recent one, thorium, down to 1902. This brings up the entire question of retrospective indexing and bibliography previous to the date 1901, designed to cover the period prior to the beginning of the international catalogue. Such a project for all science should, of course, only be taken up after mature deliberation, and could only be carried through by international cooperation. Meanwhile it seems prudent for the institution to await a careful consideration on the part of all interested in the whole subject, chemistry, being of course, but one of the large group of sciences whose workers must be considered. In view of these considerations, the importance of which you will, I am sure, recognize, I am constrained to leave the entire matter in abeyance for the present."

In view of the above it may be questionable whether the work of this committee has not been completed as far as it is possible to carry out the offices for which it was originally constituted. It may, however, be wise to continue it for another year, to await developments.

In conclusion, references should be made to the great loss sustained by the committee, the section and the association, in the death on November 19, 1903, of Dr. Henry Carrington Bolton, who from the first appointment of this committee has been its chairman. The work of Dr. Bolton in the field of chemical and alchemical bibliography needs no encomium; it is invaluable to all workers in these fields.

Jas. Lewis Howe, *Chairman*,
F. W. Clarke,
H. W. Wiley.

On Electrochemistry.

A pure iridium electrode was purchased, and some rhodium powder. It was deemed advisable to precede the electrochemical portion of the investigation by a study of the chemical phenomena caused by these metals when no current passed. With this in view experiments have been made on the action of these metals on formic acid. These have confirmed the qualitative results of Deville and Debray, that the decomposition products are essentially carbon dioxid and hydrogen under these circumstances and not carbon monoxide and water. The reaction starts at a higher temperature than one would have supposed from the statement of Deville and Debray as to 'gentle heating.' The rate of decomposition of liquid formic acid is constant when the decomposition products are allowed to pass off, but there is need of the further study of the behavior of the acid in a closed space. This will be taken up next, and after that the electrolysis. The effect of the iridium on the chemical and electrochemical equilibrium between chlorine and water will also be studied. For this work your committee asks for a grant of an additional sixty dollars.

The committee begs leave to report progress.

Respectfully,
Wilder D. Bancroft,
Edgar F. Smith.

On Grants.

The committee on grants recommended that the following grants be made for the year 1905:

To the Committee on Anthropometry, $50.

To the Committee on Electrochemistry, $60.

To the Committee on Cave Fauna, $100.

To the Concilium Bibliographicum, $100.

To W. H. Dall, to assist in republishing a rare work on mollusks, the amount to be repaid in the printed volumes, $50.

L. O. Howard,
Chairman.

On the Walter Reed Memorial.

At a meeting of the association held in Washington, a committee was appointed, of which I was made chairman, to take such measure as might be found wise for securing a permanent memorial of Major Walter Reed, U. S. A., in recognition of his important services to humanity. Acting under this authority, it was at length found expedient, after several preliminary meetings, to form an incorporation in the city of Washington to hold such funds as might be contributed. This incorporation is now endeavoring to raise the sum of $25,000, of which the income may be paid to Mrs. Reed and the principal may be devoted to a permanent memorial of Dr. Reed. More than $13,000 has been subscribed already, a large part of this amount coming from the medical profession. This is all in addition to the action of Congress, which has given, on the representations of your committee, an unusual pension to Mrs. Reed.

The effort is now making to secure the additional sum of $12,000, and the cooperation of all members of the American Association for the Advancement of Science is urgently desired.

Yours respectfully,
DANIEL E. GILMAN,
Chairman.

On the Relations of the Association to the Journal 'Science.'

We beg to report that the arrangement by which SCIENCE publishes the official notices and proceedings of the association and is sent free of charge to the members in regular standing on payment of two dollars for each appears to give satisfaction. We recommend that the contract with The Macmillan Company be renewed for the year 1905.

SIMON NEWCOMB, *Chairman,*
CARROLL D. WRIGHT,
L. O. HOWARD,
R. S. WOODWARD,
J. McK. CATTELL,
G. K. GILBERT.

The following members of the association were elected fellows:

Section A:
Hayes, Ellen, Wellesley, Mass.
Milham, Willis I., Williamstown, Mass.
Quinn, John Jones, Warren, Pa.

Section B:
Davis, Bergen, New York City.
Lewis, E. Percival, University of California.
Pegram, George Braxton, Columbia Univ., New York City.

Section C:
Dorr, Allen Wade, Washington, D. C.
Martin, F. W., College Park, Lynchburg, Va.
Schober, Wm. B., Lehigh University, South Bethlehem, Pa.

Section D:
Bissell, Geo. W., Ames, Iowa.
Blanchard, A. H., Providence, R. I.
Greene, Arthur Maurice, Jr., Columbia, Mo.
Loewenstein, L. E., South Bethlehem, Pa.
McCaustland, E. J., Ithaca, N. Y.
Wood, Arthur J., State College, Pa.

Section E:
Aguilera, Jose G., Mexico, Mex.
Bawell, Joseph, 105 Bishop St., New Haven, Conn.
Bayley, W. S., Waterville, Me.
Berkey, C. P., New York City.
Bien, Julius, 140 Sixth Ave., New York.
Boutwell, John Mason, Washington, D. C.
Bownocker, J. A., Columbus, Ohio.
Brooks, Alfred Hulse, Washington, D. C.
Bryant, Henry G., 2013 Walnut St., Phila.
Buckley, Ernest R., Rolla, Mo.
Campbell, Henry Donald, Lexington, Va.
Campbell, Marius R., Washington, D. C.
Cobb, Collier, Chapel Hill, N. C.
Collier, Arthur James, Washington, D. C.
Cowles, Miss Louise F., South Hadley, Mass.
Curtis, Geo. C., Boston, Mass.
Douglas, James, 99 John St., New York City.
Fuller, Myron S., Washington, D. C.
Goode, John Paul, Chicago, Ill.
Gordon, Charles H., Seattle, Washington.
Graham, A. W., New York City.
Grimsley, Geo. Perry.
Hayes, C. Willard, Washington, D. C.
Heilprin, A., Academy Natural Sciences, Phila.
Lyman, Benj. S., Philadelphia.
Merriam, John C., Berkeley, Calif.
Penfield, S. L., Yale University, New Haven, Conn.
Tower, Ralph Winfred, American Museum of Natural History, New York City.

Section F:
Allis, E. P., Menton, France.
Bailey, Vernon, Washington, D. C.
Bawden, H. Heath, Vassar College, Poughkeepsie, N. Y.
Beebe, C. W., New York City.
Birge, E. A., Madison, Wis.
Blake, Joseph A., 601 Madison Ave., New York City.

Brown, Arthur Erwin, Phila.
Curtis, Winterton C., Columbia, Mo.
Dahlgren, Ulric, Princeton, N. J.
Davison, Alvin, Lafayette College, Easton, Pa.
Duerden, J. E., Chapel Hill, N. C.
Evermann, Barton W., Washington, D. C.
Glover, M. Allen, Cambridge, Mass.
Guyer, M. F., Cincinnati, O.
Hall, Robert William, South Bethlehem, Pa.
Herrick, Francis Hobart, Cleveland, O.
Hunter, Walter David, Cosmos Club, Washington, D. C.
Jenkins, O. P., Stanford University.
Jones, Lynds, Oberlin, O.
Knower, H. McE., Baltimore, Md.
Linton, Edwin, Washington, Pa.
McGregor, James Howard, New York City.
Mead, A. D., Providence, R. I.
Nachtrieb, H. F., Minneapolis, Minn.
Neal, H. V., Galesburg, Ill.
Osgood, W. H., Washington, D. C.
Rand, Herbert Wilbur, Cambridge, Mass.
Rankin, Walter M., Princeton University, Princeton, N. J.
Raymond, Pearl, Ann Arbor, Mich.
Rice, E. L., Delaware, O.
Torrey, Harry Beal, Berkeley, Calif.
Weysse, Arthur W., Boston, Mass.
Wilder, Harris Hawthorne, Northampton, Mass.
Zeleny, Charles, Chicago, Ill.

Section G:

Ames, Oakes, North Easton, Mass.
Banker, Howard J., Greencastle, Ind.
Berry, Edward W., Passaic, N. J.
Blodgett, Frederick H., College Park, Md.
Burrill, Thomas J., Urbana, Ill.
Cannon, W. A., Tucson, Ariz.
Coker, Wm. C., Chapel Hill, N. C.
Coulter, S. M., St. Louis, Mo.
Duval, Joseph W., Washington, D. C.
Ferguson, A. McG.
Fitzpatrick, Iowa City, Iowa.
Holferty, George M., St. Louis, Mo.
Jeffrey, E. C., Cambridge, Mass.
Kirkwood, Jos. E., Syracuse, N. Y.
Piper, C. V., Washington, D. C.
Pond, Raymond H., 87 Lake St., Chicago, Ill.
Rose, J. N., Washington, D. C.
Shull, G. H., Cold Spring Harbor.
Spillman, Wm. Jasper, Washington, D. C.
Thornber, J. J., Tucson, Ariz.
Wylie, R. B., Sioux City, Iowa.

Section H:

Bair, Joseph H., Boulder, Colo.
Baird, John Wallace, Baltimore, Md.
Churchill, William, New Haven, Conn.
Dellenbaugh, Century Club, New York City.
Fracker, George Cutler, New York City.
Haines, Thomas Harvey, Columbus, O.
Jones, Adam Leroy, New York City.
Kirkpatrick, E. A., Fitchburg, Mass.
Messenger, James Franklin, Winona, Minn.
Spaulding, Edward G., New York City.
Witmer, Lightner, Philadelphia.
Woodbridge, Frederick J. E., New York City.

Section I:

Burton, Theodore E., Cleveland, O.
Clark, Judson F., Montreal, Canada.
Du Bois, William E. B., Atlanta, Ga.
Edmonds, Richard H., Baltimore, Md.
Foote, Allen Ripley, Home Ins. Bldg., Chicago.
MacVannel, John Angus, New York City.
Stoke, Alfred Holt, Greenville, Miss.
Stokes, Anson Phelps, New York City.

Section K:

Abbott, Alexander C., University of Pennsylvania.
Burton-Opitz, Russell, New York City.
Dexter, E. G., Urbana, Ill.
Flexner, Simon, Rockefeller Institute, New York City.
Lindley, Ernest H., University of Indiana, Bloomington, Ind.
Loeb, Leo, University of Pennsylvania.
Meyer, Adolf, New York City.
Smith, Allen J., University of Pennsylvania.
Yerkes, Robert Mearns, Cambridge, Mass.

SCIENTIFIC BOOKS.

Elements of the Differential and Integral Calculus. By W. A. GRANVILLE. Boston, Ginn and Company. Pp. xiv + 463.

A characteristic feature of mathematics in the last half century is the increasing attention paid to the foundations and rigorous development of this science. In analysis this movement began with Gauss, Cauchy and Abel in the early years of the nineteenth century and found its greatest exponent in Weierstrass. The movement thus begun has been continued by such men as Riemann, Dedekind, Hankel, Cantor, Jordan, Dini, Stolz, Harnack, Peano and a host of younger men.

As a result of these investigations it was found that much of the reasoning hitherto employed and in current use among mathematicians was either worthless or required to be