papers read and discussed at the meetings held during the last fourteen years cover not only the practical, but the theoretical ground of the iron-manufacture.

As its name indicates, this society confines itself to the consideration of iron and steel, and allied subjects. In the volumes before us we have sixteen papers, which, with the discussions, occupy 389 pages. There are 43 plates of illustrations. The remainder of the volumes, 400 pages in all, consists of notes on the progress of the iron and steel industries of the United Kingdom and of foreign countries. These notes are arranged for the different countries under the following heads: ores and fuel, blast-furnace practice, manufacture of steel, manufacture of iron, mechanical and physical properties of iron and steel, chemical properties of iron and steel, statistics. These notes contain also summaries of important papers in foreign publications.

The most valuable papers in these volumes, those on the temperature best for the greatest production of iron at least expense of coke, and on coke and gaseous fuel, have been noticed already in *Science*, Nos. 33, 50, and 59.

Vol. i. opens with a discussion on Mr. G. J. Snelus's paper on the physical and chemical characters of iron and steel. In view of the great increase of attention paid to this subject, the points of the discussion are worth a moment's notice. One of the more important points to be settled is the relation of the chemical composition and the physical treatment, hammering, heating, compression, etc., to the toughness and durability of steel used for rails and machinery.

The first researches on the subject seem to have been those of Messrs. J. T. Smith and Price Williams (*Proc. inst. civ. eng.*, 1875–76). The conclusion arrived at, that soft rails low in carbon resisted wear better than harder rails high in carbon, was contrary to the general opinion of metallurgists and engineers, which had been, that steel would wear better, the harder it was. C. B. Dudley's investigations in 1878 and 1880 (*Trans. Amer. inst. min. eng.*, vols. vii. and ix.) led him to advocate the use of soft steel for rails. The late Professor Grüner agreed with this view. But many engineers remained unconvinced; since, they argued, the rails tested might have had other causes of weakness than an unsuitable amount of carbon.

In the course of the discussion of Mr. Snelus's paper, M. Cazes, chief of the permanent way of the *Chemin de fer du midi de France*, gave some interesting tables, showing that the hard rails used on that road lasted much longer than those on the Cologne-Minden railroad, which have a composition more nearly approaching Dr. Dudley's proposed formula. There is as yet no commonly accepted measure of the work done by a rail. It is usually measured either by the tonnage borne or by the number of trains which have passed over it; but in nearly all estimates the speed of the train, which is an important element in the measure, has been left out of the consideration.

In view of all these discordant results, the physical side of the question is coming into prominence. It is said that a sudden cooling or a powerful compression favors the passage of the carbon into 'hardening carbon;' and upon this chemical effect of a physical cause, M. L. Clemandot's new process of tempering steel by compression is based. It is evident that many more experiments are needed before any satisfactory theory can be adopted.

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

Geological survey.

Microscopic rock-investigation. — In addition to the microscopic examination of thin rock-sections being made in the various divisions of the survey, especially in the Rocky-Mountain division at Denver, and by Mr. R. D. Irving and his assistants in the Lake-Superior region, arrangements have been perfected to carry on similar work at Washington, under the direction of Mr. J. S. Diller, who has recently been engaged in arranging the machinery and appliances for this work. The work of cutting and grinding rock-specimens has been carried on by Mr. Newman, under the immediate supervision of Mr. Diller. It is also intended, in this connection, to make the photographic division available; and preparatory measures, with this object in view, are being taken by Mr. Hillers, the photographer of the survey.

Rocks of Lassen's Peak. — Last July Mr. Diller, before undertaking the reconnoissance of the Cascade Range, made a six-days' trip from Red Bluff, California, to Lassen's Peak (or Butte), and collected a number of interesting rocks; and of these Mr. Newman made thin sections, the microscopic study of which occupied Mr. Diller's time during January. They included basalts, hypersthene andesites, hornblende andesites, dacites, and basaltic and andesitic tufas.

Lassen's Peak is composed of dacite. This rock Richthofen considered to be typical nevadite, but Mr. Diller's investigations confirm Mr. Iddings's view that it is dacite. Gray dacite is abundant about the southern base of the mountain, in smooth cliffs and ledges, and has a remarkably gneissic appearance. Red dacite forms the summit of the peak, and a large portion of the northern rim.

Basalt has, perhaps, the widest distribution of all the rocks found in the vicinity of Lassen's Peak, and it is, as a rule, the most recent of the flows. An older basalt has been found in the stratified tufa, which forms great belts along the western base of the mountain. Between Red Bluff and Mill-Creek valley, south of Lassen's Peak, a distance of forty-five miles, wherever the surface is not occupied by tufaceous deposits, the rocks are basaltic. Lassen's Peak is an ancient volcano, and has poured out a great variety of lavas which are arranged in a most favorable position for a study of their succession.

Rocks of Mount Shasta and vicinity. — During a part of February, Mr. Diller was busy with the microscopic study of the metamorphic and eruptive rocks collected by him last season, along the Sacramento River north of the mouth of Pit River, and on Mount Shasta. The metamorphic rocks referred to consist mainly of augitic gneisses; and the eruptive rocks of the same region are, in part, gabbros. Some of the latter present peculiarities that cannot be positively determined until some chemical examinations have been made. The specimens have therefore been submitted to Professor Clarke for chemical analysis.

Mr. Diller has examined some thirty thin sections of rocks from Mount Shasta, and finds that they are divisible into three groups; viz., hornblende andesite, hypersthene andesite, and basalt. The rocks of Shasta are quite similar to those of Lassen's Peak, with the exception that the basalts of the former are much richer in olivine, and contain less globulitic base.

Crater Mountain (or Shastina), on the north-west spur of Mount Shasta, is composed of hornblende andesite; and through this, on the western slope, there has burst a large stream of hypersthene andesite which stretches far to the westward, towards Sissen's ranch, in Strawberry valley, on the Sacramento.

RECENT PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Engineers' club, Philadelphia.

April 19. — Mr. S. N. Stewart described a cushioned pier and rolling trunnion drawbridge. With a working model, he showed that a six-pound draw could be turned by a pennyweight pressure or a breath, and claimed, that, with a leverage six times as great as that of the model, twenty pounds pressure would turn a hundred-ton draw. —— Mr. William P. Osler presented, for Mr. J. Godolphin Osborne, an account of the Pocahontas mine disaster. He showed how probable it was that gas would have been detected by the engineers had it existed, and explained the method of damming and flooding the mine with 17,500,000 gallons of water to extinguish it; the latter being accomplished in sixteen days, one day being lost in repair of a dam. The cause of the explosion is, as yet, unknown. —— Mr. E. S. Hutchinson supplemented the above by an account of his recent visit to the mine, confirming, as far as he had observed, Mr. Osborne's opinion of damage to the mine. Timbers were displaced, cars demolished, etc.; but there was no fall of roof, except in the fan-entry, where much slate had fallen, but where a week's work would repair damage. He attributed the safety of the roof to the fact that from 12″ to 18″ of coal had been left as an elastic support to the treacherous slate above. He considered the presence of five or six inches of fine, dry coal-dust on the floor a phenomenon of special interest, and, while withholding a positive opinion in view of pending investigations by a committee of the American society of mining-engineers, he referred to a number of authorities to show the important bearing dust-explosions have upon safety in mines, like this, apparently entirely free from firedamp. —— Mr. J. Foster Crowell announced that the new bridge of the Pennsylvania Schuylkill valley railroad, over the Schuylkill River at Manayunk, had just been completed, and noted, as a remarkable illustration of the vast strides made in American bridge-construction during the past few years, that so large and important structure as this is, being one-third of a mile in length and ninety feet high, can be reared and come into use without exciting special interest, or even deserving particular mention from an engineering point of view. —— The secretary read, from Mr. J. H. Murphy, a discussion of the switch formulae by Mr. John Marston. —— Mr. A. R. Roberts described a contrivance he had designed, by which a three-throw point switch can be operated from a single stand.

Linnaean society, New York.

April 18. — Mr. E. P. Bicknell read the third instalment of his paper, 'A study of the singing of our birds,' treating the Passeres to Astragalinus tristis in the same vein as the already published portions of this elaborate treatise. —— Mr. R. F. Pearsall called the attention of the society to the similarity of some of the notes of Parus atricapillus to those of Contopus virens, which accounted for the erroneous winter records of unseen individuals of the latter species. —— Mr. E. P. Bicknell related his spring observations for 1884 at Riverdale, N.Y., upon the first appearance of birds, flowers, etc. —— A communication from Judge Bicknell of New Albany, Ind., stated that the English sparrow flew from that city to the ripening grain-fields, and hence the reduction, by one-half, of the promised crop. Only a very slight indulgence in