in the *errata*. On other points relating to chemical phenomena, a considerable number of inaccuracies occur, which we have neither space nor disposition to point out; our main object being to show the necessity of greater care in the future numbers. There will, we apprehend, be little danger of the recurrence of such inaccuracies when the subject of Geology, the main object of the lectures, is on the tapis, and we anticipate much pleasure from the perusal of the future numbers of this work, as we have no doubt that they will tend equally to excite and to gratify a taste for this department of science.

The Editor has pointed out some inaccuracies in the original text, and has added, in the form of notes, several facts and observations which increase the value of the work.

Franklin Institute.

Sixty-first Quarterly Report of the Board of Managers.

The Board of Managers respectfully submit to the members of the Franklin Institute their report for the last quarter.

The lectures of the Institute closed on the 10th inst., having been, as usual, well attended, and having afforded high satisfaction to the large class which they drew together. The Board renew the expression of their thanks to the able lecturers on Chemistry, Natural Philosophy, and Technology, to whose efforts the success of the courses is due. They cannot but regret that it has not yet proved practicable to carry into effect the arrangements for extending the accommodations of the Institute, by which greater comfort would be secured for those who attend the lectures, and the lectures themselves be opened more widely to the public. The taste which the courses of the Institute has, in so great a degree, tended to diffuse throughout our community, for scientific lectures, goes on increasing in a rapid ratio, and the Board feel confident would, even now, more than justify a considerable extension of the present means to satisfy the demand. The schools of the institution have been as successful, in their way, as the lectures, and the Board feel pleasure in expressing their sense of the abilities and zeal of the teachers of ornamental, mechanical, and architectural drawing. The want of more extended accommodation for the schools is, also, severely felt.

The Journal of the Institute, under the editorship of Dr. Thomas P. Jones, with the assistance of Professor John Griscom, continues to merit and to receive the patronage of the members and of the public. The number of exchanges with domestic and foreign journals, particularly with the latter, and of subscriptions has been considerably increased, furnishing not only an additional opportunity for the selection of interesting matter for the Journal, but going also to increase the supplies for our library and reading room. These two departments continue favourite ones with the members, and are among the most useful of the institution. Several valuable additions have been made to the library by donation during the past quarter, and many by purchase. The deficiencies existing in some of the sets of foreign periodicals have been nearly all supplied.

The other collections of the Institute are increasing. The cabinet of minerals is now entirely arranged, and labeled, and by the aid of a catalogue marking the deficiencies in species, we shall have an opportunity of completing this already valuable collection. The cabinet of models re-

quires more room for the display of the articles, and a place of easier access than at present. The Board believe that when these conditions shall be realized, the collection will rapidly increase by donations. We want an extensive collection of raw materials and products of art, or a technological collection, in the widest sense of the term, and no institution in our country possesses more favourable opportunities of obtaining such, when we can furnish mechanics and manufacturers a suitable opportunity for the permanent display of their products.

The Committee on Premiums and Exhibitions have nearly completed the arduous task of preparing their report upon the articles submitted last autumn for examination. The care which is always exercised in the awards made by the Committee, necessarily delays their report, and on this occasion the very great number of articles brought forward, has increased the delay beyond what is usual. The Board are pleased to be able to state that the report of the Committee will very soon be in a state to submit to the members.

The Committee of Science and the Arts have pursued their usual useful labours. Inventors, though frequently disappointed in the result of the cool judgment by the practical and scientific men composing the sub-committees, have the candour sometimes to commend the good advice which they receive. Many thanks are due to these members who devote valuable time to labours, the results of which very frequently do not appear before the public, and who are thus deprived of a powerful stimulus to exertion in the appreciation by the public of their useful labours.

Since the last report, the award of two Scott's legacy premiums has been recommended, and a sub-committee is now engaged in examining such articles submitted at the last exhibition as may be returned for the purpose of competing for this premium. The Board learn that the die for the medals which are to accompany the premiums, an appropriation for which has been authorized by our City Councils, is in preparation, and hope soon to be able to submit it to the inspection of the members. By reference to the conditions of the award of these premiums, it will be seen that they are liberal, and intended to render their attainment by meritorious inventions as easy as possible.

The monthly meetings have been revived lately under the charge of a committee from the Institute, with the spirit which formerly characterized them; and the attendance has increased at once with the efforts to present attractions to the members.

The Board have still to regret the failure of the appropriation in the Legislature of our State, for establishing a School of Arts. It is truly remarkable that in a state like ours, so dependent upon mechanical industry for its prosperity, the importance of establishing a school in which the principles of science bearing upon the arts, should be taught to young mechanics, in the way, and within the time, suited to their business, should not be so generally admitted, as to secure the cordial co-operation of the Legislature. The Board continue to keep this important object steadily in view, and hope that public opinion will ultimately set so strongly in favour of the School of Arts as to be irresistible.

In conclusion, the Board congratulate the members of the Franklin Institute on the continued prosperity of the Institution.

The following named gentlemen have become life members during the

present quarter: Hector Orr, Edward Miller, Ellwood Morris, Richard C. See, and Jos. M. Truman.

The Treasurer's account is herewith submitted.

JOHN AGNEW, Chairman.

WILLIAM HAMILTON, Actuary.

April 17, 1839.

COMMITTEE ON SCIENCE AND THE ARTS.

Report on E. Tilghman's Railway Bar.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania, for the promotion of the Mechanic Arts, to whom was referred for examination an improved Railway Bar, invented by Mr. Edward Tilghman, of Philadelphia, Penn., REPORT:—

That "the nature of the improvement consists in so forming the bar that there shall be a reduction of the height usually given to the **I** rail between its head and the base on which it rests: thereby diminishing the leverage of the rail, while its strength and capability of being firmly secured to the cross tie, are provided for by the addition of a rib directly under the centre of the base, which rib may be made plain, trapezoidal, or with a lower web.

To fasten the rail, the lower rib is inserted in the cross ties, and wedged securely to its place, where it is supported conjointly upon the ordinary base, and the under part of the lower web. A chair, or flat plate of iron, is inserted immediately under the upper base, or support, to receive which, notches are made in the ends of the bars, so that when two of them are put together, these notches form a mortise through which the chair is to be inserted. The chair is affixed to the cross ties" by spikes or screws.

The Committee having tested the strength of the improved *trapezoidal* rail, weight 48 lbs. per yard, by the rules laid down by Professor Barlow in his account of "Experiments on the transverse strength and other properties of malleable iron, with reference to its uses for railway bars," feel satisfied it will sustain a weight of from six to seven tons without injury, (the supports being 33 inches apart) or about 75 per cent. more than the most approved rail of similar weight now in use.

With reference to *leverage*, the improved rail is decidedly preferable to the **I** rail, the distance between the upper surface and support being considerably less, and as its entire depth is greater than that of any other rail known to the Committee, (and may be increased at a slight expense without changing the position of the main support, or increasing the leverage,) it consequently follows, as the depth governs the deflexion, that the improved rail is much the most stiff and rigid.

In point of economy, the Committee are of opinion that the improved *trapezoidal* rail will be found less expensive than the **I** rail. The plan suggested for connecting the bars, and attaching them to the sills, they conceive permanent and simple.

By order of the Committee.

WILLIAM HAMILTON, Actuary.

March 14, 1839.