Watson, the sum of about fourteen thousand dollars had been placed in his hands. When the estate is finally closed, a further sum will be paid over to the academy. The income of the Watson fund is to be used, under the direction of three trustees, — Messrs. J. E. Hilgard, S. Newcomb, and J. H. C. Coffin, — for the purpose of aiding astronomical researches. In accordance with the recommendation of the trustees, the academy granted five hundred dollars from this fund, towards defraying the expenses involved in observations of the total solar eclipse of May 6, 1883.

Later in the meeting, Professor Simon Newcomb of Washington was elected vice-president, and Professor Asaph Hall of Washington, home secretary. Five new members were elected: Professor A. Graham Bell of Washington; Dr. J. S. Billings, U.S.A., of the U.S. army medical museum, Washington; G. K. Gilbert, of the U. S. geological survey; H. B. Hill and C. L. Jackson, professors of chemistry in Harvard college. The whole number of members is now ninety-five.

On the afternoon of Thursday the academy adjourned to take part, by invitation, in the ceremonies attending the unveiling of the statue of Professor Henry in the grounds of the Smithsonian institution. The time for these ceremonies was purposely fixed to coincide with that of the spring meeting of the academy. Henry was pre-eminently a scientific man, and, at the time of his death, president of the academy; and yet the members of the academy were placed far down the line in the procession, — after the commissioners of the District of Columbia, and after officers of the army and navy. This fact must be regarded as evidence of a lack of appreciation of the relations existing between Henry and the academy, and of the true worth and dignity of science.

The exercises, which were in good taste, began with a short address by Chief-justice Waite. After this, at a signal, the covering was quickly drawn aside, instantly revealing the entire statue. Loud applause followed, those who were seated rose to their feet, and all hats were removed. The scene was highly impressive; and when the philharmonic society, accompanied by the full marine band, burst forth with Haydn's grand chorus, 'The heavens are telling,' the heart must have been a hardened one which did not experience a feeling of exaltation.

In the opinion of all, the statue is dignified and pleasing, and vividly calls to mind the honored original. President Porter's oration, which was the principal event of the afternoon, was listened to with much interest. It dealt with the plain facts of the life of Henry, and was all that his best friends could have desired.

Among the pleasantest social features of the meeting was a reception given to the members of the academy on Thursday evening by Prof. A. Graham Bell. There were present many well-known gentlemen, among them, Gen. Sherman, Chief-justice Waite, Senator Sherman, ex-Secretary Blaine, and the Japanese, Swedish, and Belgian ambassadors.

THE DECAY OF ROCKS GEOLOGICALLY CONSIDERED.[1]

THE author, in this paper, presented in a connected form the principal facts in the history of the decay both of crystalline silicated rocks, and of limestones or carbonated rocks, by atmospheric agencies. Having first discussed the chemistry of the process, he noticed the production of spheroidal masses, or so-called bowlders of decomposition, by the decay and exfoliation of massive rocks. He then proceeded to show that the process of decay is not, as some have supposed, a rapid or a local one, dependent on modern conditions of climate, but that, on the contrary, it is universal, and of great antiquity, going back into very early geological periods. These conclusions were supported by details of many observations among paleozoic stratified and eruptive rocks in the St. Lawrence valley, as well as among eozoic rocks in the Atlantic belt, as seen in Hoosac Mountain, in the South Mountain, and in the Blue Ridge. In connection with the latter he described the decay, not only of the crystalline strata, but of their enclosed masses of pyritous ores, and the attendant phenom-

[1] Abstract of a paper read by T. STERRY HUNT, LL.D., F.R.S., before the National academy of sciences at its meeting in Washington, April, 1883.

ena. The decay of the primal and auroral strata of the Appalachian valley, and the formation therein of clays and of iron and manganese oxides, was also discussed. The pre-Cambrian antiquity of the process of decay in the eozoic rocks of the Mississippi valley, as shown by Pumpelly and by Irving, as well as similar evidence from Europe, was noted, while the more recent decomposition seen in the auriferous gravels of California was described and explained.

The final removal of the covering of decayed rock from many northern regions during the drift period was then considered; and the thesis advanced by the speaker in 1873, that the decay of rocks "is an indispensable preliminary to glacial and erosive action, which removed previously softened materials," was discussed in its relations to bowlders, glacial drift, and the contour of glaciated regions. Pumpelly's development and extension of this doctrine to wind-erosion was noticed, and also the recent comparative studies of Reusch in Norway and in Corsica, in which similar views are enforced.

The principal points in the paper, as reviewed at its close, are as follows: —

1. The evidence afforded by recent geological studies in America and elsewhere, of the universality and the antiquity of the subaerial decay, both of crystalline silicated rocks and of calcareous rocks, and of its great extent in pre-Cambrian times.

2. The fact that the materials resulting from such decay are preserved *in situ*, in regions where they have been protected from denudation by overlying strata, alike of Cambrian and of more recent periods; or, in the absence of these, by the position of the decayed rock with reference to denuding agents, as in driftless regions, or in places sheltered from erosion, as within the St. Lawrence and Appalachian valleys.

3. That this process of decay, though continuous through later geological ages, has, under ordinary conditions, been insignificant in amount since the glacial period, for the reason that the time which has since elapsed is small when compared with previous periods; and also, probably, on account of changed atmospheric conditions in the later time.

4. That this process of decay has furnished the material, not only for the clays, sands, and iron oxides from the beginning of paleozoic time to the present, but also for the corresponding rocks of eozoic time, which have been formed from the older rocks by the more or less complete loss of protoxide bases. The bases thus separated from crystalline silicated rocks have been the source, directly or indirectly, of all limestones and carbonated rocks, and have, moreover, caused profound secular changes in the composition of the ocean's water. The decomposition of sulphuretted ores in the eozoic rocks has given rise to oxidized iron ores *in situ*, and to rich copper deposits in various geological periods.

5. That the rounded masses of crystalline rocks, left in the process of decay, constitute not only the bowlders of the drift, but, judging from analogy, the similar masses in conglomerates of various ages, going back to eozoic times; and that not only the forms of such detached masses, but the surface-outlines of eroded regions of crystalline rocks, were determined by the preceding process of subaerial decay of these rocks.

THE ORIGIN OF CROSS-VALLEYS.

I.

DR. FR. LÖWL of Prague contributes an interesting article on *Die Entstehung der Durchbruchsthäler* to a recent number of *Petermann's mittheilungen* (1882, 405–416), and comes to the conclusion that transverse valleys or water-gaps are never formed by the persevering action of an antecedent or pre-existing river on a slowly rising mountain fold or fault. "Erosion can, under no circumstances, keep pace with mountain folding" (409). Cross-valleys are then accounted for in two other ways, — first, occasionally by erosion at the outlet or point of overflow of the lake formed behind the rising mountain barrier; second, and so frequently as to constitute the general method, by backward erosion at the head of a lateral valley, which finally cuts through the ridge separating two longitudinal valleys, and allows the higher to drain across into the lower, so that in a folded mountain system of great age the original order of drainage on the longitudinal valleys is often entirely effaced (411). Several carefully examined cases of this kind are described for the eastern Alps and elsewhere. The question does not arise now whether these examples are correctly determined: presumably those to which sufficient local study was given are decided safely enough; for this backward origin of certain gorges is eminently possible. The question is rather, whether nearly all cross-valleys are of this ancestry, and whether the antecedent valley nowhere exists. We consider Löwl's affirmative answer to this question essentially incorrect, and believe that his