

had hardly died down when Vesuvius opened a new chapter in its history and closed it with the outbreak of April, 1906, which in violence and destructive effect is thought to have surpassed all other eruptions of that volcano, with the exception of those of the years 79 and 1631. Then, nearer to our own hearts and homes, the tragedy of San Francisco was enacted—followed in almost exactly four months by the still greater tragedy of Valparaiso, in Chili. Before the close of 1906—a year which had also witnessed in its early days the minor disturbances of Esmeraldas in Ecuador, of Buenaventura in Colombia, and of Castries in the island of St. Lucia—a great part of the city of Arica lay in ruins. And now, with the beginning of the year 1907, the seismo-volcanic registry records the eruptions of Mauna Loa and Etna, the continuing vast flows of lava from the Savai volcano in the Samoan Islands, and the appalling disaster which has converted the capital of the island of Jamaica into a mass of debris.

In all these events we see the earth in the making—a process now, as ever, destructive. Within this quarter-century the population of the globe has been diminished by not less than 125,000 or 150,000 as the result of terrestrial catastrophism. Possibly the figures should be even larger, for the records are incomplete.

ANGELO HEILPRIN.

Philadelphia, January 18.

The Scientific Papers of J. Willard Gibbs. 2 vols. New York: Longmans, Green & Co. \$9 net.

That Josiah Willard Gibbs advanced science the world over more than it has ever been given to any other American researcher to do, can hardly be questioned. He published but one separate book, his "Elementary Principles in Statistical Mechanics" (Charles Scribner's Sons), which appeared in the Yale Bicentennial Series in 1902, the year before his death. Another volume in the same series, written by his pupil, Edwin B. Wilson, was founded on his lectures. His only other printed remains are the papers now collected, which are few but fundamental. They are substantially limited to three, not counting an unusually small number of preliminary

and supplementary outputs. Of the earliest, relating to diagrams and models representing the effects of temperature and pressure on all sorts of substances, Clerk Maxwell once spoke to the present reviewer in terms of warm laudation, before Gibbs had produced anything else, and when he was all but unknown in this country. His second work, on the equilibrium of heterogeneous substances, taught chemists how to reason about the final results of reactions (without reference to the processes by which they were reached), and it stands to-day the stone at the head of the corner of dynamical chemistry. The memoir itself (in which, by the way, was first given the now celebrated "phase rule") occupies three hundred pages of the first of these two volumes, a good many more pages being substantially parts of the same whole.

The second volume is mainly occupied with Gibbs's peculiar calculus called "vector analysis," which was designed to super-

sede quaternions and Grassmann's *Ausdehnungslehre*. It is now taught in sundry European universities; but its vogue was prevented or hindered by a trait of its author's character that struck everybody that ever met him, and that we know not how otherwise to designate than as diffidence. Yet this is not a fit name for it. It certainly was not that diffidence which consists in timidity; nor can we assent to his brilliant scholar Prof. Bumstead's apparent view that he was unconscious of his own superiority, which would come too near to making him a gifted idiot, rooting up his mathematical truffles like a Périgord pig, and as oblivious of being deprived of them. We should rather conceive of it as an exaggerated estimate of the possibility of any opinion of his being erroneous that might concern a difficult question not susceptible of a demonstrative solution. He thought his method ought to be left to make its own way in the world; but he overlooked the fact that he was not giving the offspring of his brain the fair start to which it was entitled. For he limited himself to printing and privately circulating a fifty-page syllabus of that method, with no illustrations of its application. The industry of a man of great parts and attainments would not more than have sufficed to construct any decided opinion upon such a question from such a basis. If Gibbs himself, after devoting his own surpassing genius for some years to the matter, was not prepared to put forth a categorical decision as to the merits of the method, pray who else could be expected to undertake the office? We can only say that the ease and mastery with which his scholars have handled some of the most thorny problems of physics, as contrasted with the infertility of the quaternionists, incline us to put our trust in "vector analysis."

The book is clothed in all dignity and beauty of paper and type, carries a noble photograph of the master, and in every way (except by an index) recommends itself to the liking of friends of American science.

There is a good, but restrained, notice of this most genuine of high intelligences by a worthy interpreter, Prof. H. A. Bumstead, who has taken Dr. Ralph Gibbs Van Name as his collaborating editor.

The following scientific books are included in Macmillan's list of spring publications: "Cyclopedia of American Agriculture," vol. 1, edited by Prof. L. H. Bailey; "Experimental Zoology," by Thomas Hunt Morgan; "Economic Geology of the United States," by Heinrich Ries; "Forage Corps," by Edward B. Voorhees; "The Storage Battery," by Augustus Treadwell; "Practical Text-Book of Plant Pathology," by D. F. McDougall; "Introduction to Zoology," new edition, by Charles Benedict Davenport and Gertrude Crotty Davenport; "Elements of Electro-Chemistry," by M. Leblanc; "Types of Farming," by L. H. Bailey; "Meteorology, Weather, and Methods of Forecasting," new edition, by Thomas Russell; "Principles of Inorganic Chemistry," new edition, by H. C. Jones; "Studies in Physiology, Anatomy, and Hygiene," new edition, by J. E. Peabody; "The Common Bacterial Infections of the Digestive Tract," by C. A. Herter; "Lectures on the General Properties of Immunity," by Svante Arrhenius; "System

of Medicine and Gynecology," vol. II, Part I, edited by Thomas Clifford Allbutt; "Clinical Psychiatry," new edition, by A. Ross Diefendorf.

The ascent of Mt. Ruwenzori, the ancient Mountains of the Moon, last summer was described in a lecture delivered at Rome on January 7 by the Duke of the Abruzzi. In a little over a month he climbed the sixteen highest peaks, made a survey of the range, determined heights, fixed the watersheds, and mapped and photographed the whole region. The principal scientific results are the fact that the range consists of six principal groups, 16,810 feet being the altitude of the highest peak. The limit of perpetual snow was about 14,600 feet, and of the lowest glacier 13,677. None of the glaciers were of the first order, and they showed signs of receding.

Finance.

THE BREAK IN THE STOCK MARKET.

About the middle of last December, after having held obstinately strong in the face of extremely tight money, repeated deficits in New York bank reserves, and prohibitory rates charged in London for "carrying" American securities, Stock Exchange prices suddenly began to give way. Since then, the decline has been almost continuous, up to the present week. During the five-week period, such striking declines in the price of important railway stocks have been scored as 20 points in Chicago, Milwaukee and St. Paul, 23 in Union Pacific, 34 in New York Central, 39 in Reading, 63 in Northern Pacific, and 80 in Great Northern. People, learning of such a fall in prices, might easily infer either that a serious disaster had befallen the world of investors, or else that the Stock Exchange movement was foreshadowing a highly unfavorable turn in our tide of prosperity.

And, in fact, the violent fall in prices last week and at the opening of this week, had so far cut the ground from under the feet of speculators—who had been holding huge lines of stocks with money borrowed on collateral of these very stocks—as to force liquidation and some signals of real distress. This, however, was pretty much restricted to that class of people known in Wall Street as "Stock Exchange professionals." No one else seems to have been badly hurt. The outside public, which lost millions in the Wall Street collapse of May, 1901, and which was probably hard hit in the two-day crash of December, 1904, has on the present occasion made little complaint. At the same time, no signs of trade reaction, or of alarm in business circles, is anywhere manifest. Instead, one hears the general comment, that legitimate industry is in a far safer position, now that Stock Exchange speculation has collapsed and Stock Exchange prices have come down.

Nevertheless, there still exists, even in Wall Street itself, a good deal of perplexity as to why the stock market should have fallen at just this time. Two months ago, every one on Wall Street had a word

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ler while they were excavating in the
am. Indeed, it was this fortunate pur-
se that directed their attention to the
site. Already, in 1895-6, an Arab trad-
er from the Pyramids had dug over the
necropolis for scarabs, ushabtis,
tuettes, vases, and the like, and had
own away as useless large quantities
the papyrus-cartonnage from the mum-
s. The presence of many literary frag-
nts indicates that the papyri used for
cartonnage of a number of the mum-
s came from a library of classical lit-
ture, probably belonging to some Greek
tler at Oxyrhynchus, the town a few
les farther up the river, where Messrs.
uffell and Hunt have conducted their
st successful excavations.
The eighteen new classical fragments,
groups of fragments, here published
tain several cruelly mutilated bits from
at Prof. F. W. Blass suggested must be
"Tyro" of Sophocles. They would not
so comminuted had not the breast-
ce of the cartonnage from which they
ne been decorated by cutting into it an
en-work pattern. Certain small frag-
nts from an Attic comedy are identified
an interesting process of reasoning as
ably written by Philemon, and as
ming part of the play on which the
ularia" of Plautus was based. The
st point is established chiefly by com-
ring a fragment consisting of only a
r letters at the beginning of some half-
dozen consecutive lines, with the quo-
tion by Eustathius, in his commentary
Homer, of a single line from Philemon,
λαλῶν σοὶ καὶ Μίδῳ καὶ Ταυρίδῳ (Kock, Jr.
). This is the only place in Attic comedy
ere Ceresus is known to be mentioned. But
first line of the fragment referred to above
to begin "ποῖς . . ."; and, furthermore,
e other fragments tell various machina-
ns of a slave Strobilus, and also har-
nize well with the "Aulularia" in other
pects. (It sho . . . be noted that so emi-
nt an authority as Fr. Les, in *Hermes*
p. 629, vigorously demurs.) Bits
a manuscript . . . of "Choice Selec-
ons" include the beginnings of four
mbic verses, of which the last is evi-
ntly the "Evil communications corrupt
od manners," quoted by St. Paul (1 Cor.
33)—ascribed to both Euripides and
enander, and perhaps occurring in both
thors. A fragment of thirty-four nearly
rfect lines gives apparently the open-
g of a discourse on music. Blass thinks
may be from the pen of the sophist
ppias, a contemporary of Socrates. In
bject it is not untimely; for it combats
e theory held, among others, by Plato,
at different sorts of music produce dif-
rent moral effects in the listeners. It
so ridicules the pretensions of the musi-
ans, who profess to picture in their
rains the qualities of natural objects.
Among the fragments of extant classical
thors found at El-Hibeh are a number
m Homer's "Iliad," which show the now
miliar divergence of text from the vul-
ate, and one fragment from the "Odyssey"
x. 41-63), in which similar divergence oc-
rs. This is the first early Ptolemaic frag-
nt of the "Odyssey" to be discovered. The
ltors take occasion to uphold at some
gh, in view of this new evidence, and in
ce of recent attack (chiefly by A. Lud-
ch), their earlier theory that the vulgate
at of Homer did not indeed originate with

the Alexandrians, but certainly was not the
prevalent text in Egypt until some time be-
tween 150 and 30 B. C. Its final accept-
ance, they think, must have been due in
some measure to the influence of the mu-
seum scholars. A sentence deserves quo-
tation in full:
A comparison of the papyri of extant
Greek authors with the corresponding por-
tions of the mediæval MSS. shows that the
early texts hardly ever favor in a marked
degree any one of the later MSS. or families
of MSS., while in the case of some authors,
e. g., Xenophon, the papyri show that mod-
ern critics have often gone too far in pre-
ferring one family of MSS. to another, and
prove clearly, what is apt to be sometimes
forgotten, that the proper guiding principle
in the reconstruction of the text of any
ancient author is a judicious eclecticism.
That last clause is sufficiently sweeping. We
fancy it will be challenged by many of the
scholars who hold no brief for the papyri.
A few fragments of the "Iphigenia in
Tauris" of Euripides are interesting be-
cause the date of the writing (c. 280-240
B. C.) carries them well back toward the
life of the poet. The text agrees with two
conjectures of Reiske and Bothe (vv. 252
and 618), and almost with another of Maeh-
ly (v. 621), and furnishes a new reading
in v. 537 that was not anticipated.
Among the non-literary fragments are
found, as in the other volumes, many that
throw new light upon the life and admin-
istration of the region under the Ptolemies.
Among them may be noted here four bail-
bonds that are by far the oldest examples
of such formulas thus far known (263-c.
250 B. C.); and particularly an account of a
royal post office, wherein note is made of
the day and hour of the arrival of each
messenger, of his name and the name of the
clerk who received his packets from him, of
the number of the packets and the addresses
upon them, and of the names of the mes-
sengers to whom they were entrusted for
further conveyance.
Three appendices of importance follow
the texts. One is on the relation between
the Macedonian and Egyptian calendars,
the second on the systems of dating by the
years of the king, and the third on the
eponymous priesthoods from 301-221 B. C.
The usual good indices and ten excellent
plates of facsimiles close the volume.

Science.

A *History of Chemistry*. By Ernest von
Meyer. Translated by George McGovern.
New York: The Macmillan Co. \$4.25 net.

This is a third edition; but great pains
and no little ability have been used in
bringing it to date. It is decidedly the
most useful history of chemistry, though
Ladenburg's smaller book carries more
weight as an authority. The author has
undertaken little more research than that
of a faithful compiler, guided by good
sense. He intends to give very brief, but
generally fair, notices of the most inter-
esting controversies, whether chemical or
personal; and has aimed to narrate the
whole history of chemistry so far as one
volume could include it, without wasting
one line upon any facts extraneous to the
science, merely for the sake of holding a
reader's interest. Three quarters of the
volume are devoted, as was proper, to the

modern period, when every theory has been
subjected to quantitative tests. It is di-
vided into two chapters, the one a survey of
the advances toward an understanding of
chemical combinations generally; the other,
somewhat longer, going into particulars,
with separate sections on analytical, inor-
ganic, organic, physical, mineralogical, phy-
siological, technical, and pedagogical chem-
istry.
The book begins with a short history of
the chemistry of the ancients. Many excel-
lent special works on this subject, some
of which are named, absolved the author
from a longer account of it. We note
that the word "bronze," from *σπογγιον*, may
be of Persian origin. The name "Nu-
bia" is thought to be from the Egyptian
word for gold, "nub"; and we read that the
gold mines of that country yielded, under
Ramses II., no less than £125,000,000 an-
nually. The remainder of the first quarter
of the book is composed of three chapters,
on alchemy, on the chemistry of Paracel-
sus, Van Helmont, George Agricola, and
their contemporaries, and on the chemistry
of the age of phlogiston from Boyle to
Black and Priestley. The services of West-
ern alchemists are exaggerated, as they
usually have been. Science is enriched by
those whose nature is to aspire after truth,
not by those who are goaded on by naught
but gold-greed.
The section of the work that deals with
organic chemistry should be the best, not
merely because it is the field in which
chemical research proper, as distinguished
from chemical physics, has met with its
greatest, perhaps its only signal, successes,
but also because we read on the title-page,
"Being also an Introduction to the Study
of the Science." Now in organic chemistry
every group of bodies has presented a
problem, the problem of the constitution
of those bodies; and in every case as the
science now stands, this problem either
has already been worked out, or is ap-
proaching that end, by the thorny, but in-
teresting and instructive, path of alternate
reflection and experimentation. What we
find is that, at the bottom of each page,
Professor Von Meyer has cited, on the aver-
age, four or five memoirs. The dates are
seldom given; merely the authors' names.
The titles of the journals (of which there
are forty or more), numbers of the volumes,
which run up into the hundreds, and the
numbers of the pages. If, however, the young
student does not read those memoirs, there
is nothing in Von Meyer's pages to give
him any clear idea of the course of chemi-
cal thought, unless in its very first essays.
All he will find is only a very general in-
dication of what each memoir contains, ex-
pressed in technical terms, with vague
comments about each, such as a chemist
whose memory was rather hazy concerning
a memoir might make in conversation with
a brother chemist. Take, for example,
one of the most important and long puz-
zling matters, upon which a vast deal of
reasoning and laboratory work was spent
by a dozen leading chemists, as well as
by many others. We refer to what is call-
ed Perkin's Reaction. On this subject Von
Meyer begins with this vague remark:
The beautiful synthesis, by W. H. Per-
kin, sr., of unsaturated acids from the
aldehydes and the salts of the fatty acids,
has made these compounds more easy to

come by, and therefore to investigate, and
has thus helped to elucidate their consti-
tution.
He goes on for a dozen lines of such matter,
which, even if a beginner could understand
it, would give him no idea of the thought
that has been expended upon the phenom-
enon. Not one word is vouchsafed in regard
to the successive intensely interesting re-
searches which were believed to throw light
upon the rationale of the reaction. The
memoirs cited at the foot of the page may
refer to them. He does say that "the sys-
tematic researches of Fittig and his pupils
have contributed to round off and deepen
our knowledge of this class of compounds";
but is not that a bit vague? We find no
mention in text or notes of the names of
Bertagnini, Genther, and Hübners, who be-
fore Perkin had severally published perti-
nent facts; or of the paper of Conrad and
Bischhoff, which corrected an error in Per-
kin's formula.
In short, the work is convenient, because
there is no better one (except Laden-
burg's, which is too small), and in spite
of its numerous inconveniences. Among
these is its avoidance of dates for which
the word "recent," in a highly elastic
sense, and relative to the first, second, or
third edition, is made to do duty far too
often. As to the book's serving as an "In-
troduction" to chemistry, we do not under-
stand in what sense it can have been so
regarded. A volume far more explanatory,
from the same publishing house,
Lachman's "Spirit of Organic Chemistry,"
begins, "This book is intended primarily
as a supplement to text-books of organic
chemistry." Even that book could not be
understood by a beginner in the subject,
though it might introduce a more advanced
student to the practice of reading the mem-
oirs. Nobody can be a scientific man of any
kind who has not that habit. Chemists of
this continent, quite unintentionally no
doubt, have received signally less than jus-
tice at Von Meyer's hands, except Malier,
Sterry Hunt, and one or two others.
The next volume in the New Knowledge
Series, edited by Prof. Robert Kennedy
Duncan and published by A. S. Barnes &
Co., will be "The Nature and Origin of
Life," by Prof. Felix le Dantec of the Fac-
ulty of Sciences at the Sorbonne.
"Birds and Flowers About Concord, New
Hampshire," is a little book of some one
hundred and twenty pages, by Miss Frances
M. Abbott. She presents a short list of
nature books, twelve short essays embrac-
ing notes upon the two hundred and one
species of birds observed by herself and others
in the township, and similar essays on the
five hundred and forty species of flowers.
Every city and larger town should have an
inexpensive hand-book such as this, but
with clearer descriptions and a compre-
hensive index. It would have a ready sale
in the schools and houses of the vicinity,
and would be of great value to the ubi-
quitous summer boarder. If such books
were printed with interleaved blank pages
local students would be encouraged to in-
crease the lists and thereby make the work
ultimately of considerable scientific value.
In the Proceedings of the Zoological So-
ciety of London for 1906, R. Shelford pre-
sents a significant discovery relating to
flying snakes in Borneo. Two of these

belong to the genus *Chrysopelea*, while the
third is *Dendrophis pictus*. The reptile
crawls out along some horizontal branch,
and, gaining impetus, launches itself into
the air. Instead of falling in writhing
coils straight to earth, it becomes rigid
as a stick, and glides downward in an
oblique line, landing lightly either in the
water or upon the bare ground. Mr. Shel-
ford discovered the peculiar structure
which made this feat possible. The reptile
has the power, by a forcible muscular con-
traction, of changing the shape of its body
(considered as a section view) from almost
a circle to a deep concave below. Mr.
Shelford compares this to two pieces of
bamboo, one of which is entire, and there-
fore circular in outline, while the other
is bisected so that it is a semicircle in
section. When dropped from a height the
former will fall like a stone, while the
split piece will glide obliquely downwards,
and even describe a slightly upward swoop
just before it reaches the ground. It was
found that the snakes fell helplessly if
merely thrown out into the air. They had
to have somewhat of a flying start to as-
sume properly the convexity and rigidity of
their parachute pose.
Teachers of astronomy in secondary
schools and small colleges who have felt
unable to buy the costly but magnificent
photographs of the moon taken at the
Paris observatory, may be glad to know
that the set, full-size and well-printed, is
appearing in the *Bulletin* of the Société
Belge d'Astronomie, accompanied with ex-
tended descriptive notes by Loewy and
Puisieux. Plate 46 appeared in the Novem-
ber number. The *Bulletin* is sent free to
all members of the society, and the dues
are very low.
The January number of the *Bulletin of the
American Geographical Society*, in an ar-
ticle on the "Topographic Surveys in the
United States," by H. M. Wilson, sum-
marizes the work of the topographic branch
of the United States Geological Survey for
the year 1906, and briefly reviews the past
activities of this branch of service. From
this review it would appear that for several
years the average annual rate of completed
topographic survey has been 25,000 square
miles, or an area nearly equal to that of
the State of Indiana. Despite this pro-
gress the total surveyed area of the United
States is at this time hardly one-third (1-
025,000 square miles) of its full area. The
mapping of the States of Connecticut, Mas-
sachusetts, New Jersey, Rhode Island, and
the Indian Territory is now completed, and
that of West Virginia will be completed, it
is confidently expected, by the close of this
year.
The American Alpine Club, an associa-
tion organized for the study of the high
mountain regions of the Western Hemi-
sphere and of other tracts having Alpine
characteristics, has just issued in a small
folio of 16 pages Number 1 of *Alpina
Americana*. The number contains a single
article, "The High Sierra of California," by
Prof. Joseph N. Le Conte, of the Universi-
ty of California. The paper deals with
the geographical, geological, zoological, and
botanical features of the more imposing
sections of the Sierra Nevada Mountains.
Considerable space is devoted to a de-
scription of the King's River basin, of
which the King's River Cañon is the most

conspicuous scenic feature. Prof. Le Conte
enumerates fifty-nine summits of the Sier-
ra Nevada which exceed 13,000 feet in ele-
vation, and of these twelve surpass 14,000
feet, the loftiest being Mount Whitney, with
an altitude of 14,499 feet. It will be of in-
terest to mountain climbers to know that
this peak, but little inferior in height to
the Matterhorn, has now a horse-trail to
the summit. The initial number of *Al-
pina Americana* is attractively illustrat-
ed, and its value is further enhanced by the
addition of a large folded map.

Drama.

SOME THEATRICAL CONDITIONS.

The dramatic season has now advanced
to a point where it is possible to review it
as a whole, summarize its accomplishment,
and speculate on the outcome of existing
theatrical conditions. The prospect can-
not be called brilliant, but, on the other
hand, it is by no means discouraging. There
are signs of an impending change in the
general direction of theatrical affairs, but
they are scarcely definite enough as yet to
warrant predictions. The power of the
original theatrical trust, though still pre-
dominant, has been weakened by opposi-
tion and may be expected to diminish by
the natural growth of a competition now
successfully started—whether the legal at-
tack upon its methods be defeated or not.
This is one of the most hopeful features of
the situation. Not that the so-called inde-
pendent movement is in itself altogether
a good thing. The organizers of it, in a
large degree at all events, have adopted the
mischievous policy of their opponents. They
too are building up a system of stars re-
volving around a perpetual circuit, in al-
most endless runs, on principles which are
primarily commercial. The claim that they
fight under the banner of art alone rests
upon the flimsiest of foundations. But they
have demonstrated the possibility of com-
petition and by partly upsetting a monop-
oly have begun a process of disintegration
out of which something like free trade in
drama may ultimately come.
Although most of the season's plays have
been trivial and foolish, there can be no
doubt that the average quality of the win-
ter's entertainment has been raised con-
siderably above that of recent years by a
uncommon number of really meritorious
productions. Some of these were distin-
guished by both literary and dramatic ex-
cellence; others by serious purpose, in-
genious fancy, or sparkling humor. In the
first category may be placed Stephen Phil-
lips's "Paolo and Francesca" and Perc
Mackaye's "Jeanne d'Arc," both of high
quality. The plays with a solid purpose
include George Broadhurst's "The Man of
the Hour," Charles Klein's "The Lion and
the Mouse" (now more than a year old
and Henry Arthur Jones's "The Hypo-
crites," a remarkably well-made piece.
William Vaughn Moody's "The Great Di-
vidé," with its vividly contrasted types and
its conflict of characters, stands in a class
by itself in its indisputable if rather crude
dramatic power. A. W. Pinero's "H
House in Order," with all its artificial
and trickiness, is a model of artistic co-