Science and the Classics.¹

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IT has been the rule from time immemorial, not the exception, for science and the humanities to go hand in hand. Aristotle the naturalist wrote of poetry; Plato was a lover of astronomy; Theophrastus the botanist was a master of rhetoric, whom even Cicero admired; Celsus the physician was an encyclopædic scholar after the taste and fashion of his age. When the humanistic tradition was at its height in the 'revival of learning,' Galen and Hippocrates were read by all. Linacre the physician helped to bring Greek into England, and was one of the great scholars of his time. Moreover our physicians have never lost but have richly inherited and enjoyed the classical tradition; Payne and Greenhill, Osler and Clifford Allbutt in our own time, were scholars after the manner of Haller and Boerhaave and Richard Mead and Sir Thomas Browne. Cuvier, busiest of men, wrote a commentary on the natural-history books of Pliny. Linnaeus himself could write of Nature with a scholar's pen and look upon her with a poet's eyes: the severe "Systema Naturae" was the work of one who fell on his knees when he beheld the sunlit gorse at Hampstead, and apostrophised mother Nature in words which sound like the echo of an Orphic hymn: "Natura, Filia Dei, rerum omnium Magistra, autodidactos, indesinenter laborans, nunquam festinans," etc.

If a man's mind be open to the influences of culture at all, he finds not a little of it within the range of his own profession, even though it be a technical one. My own science of zoology looks a very different thing at my age from what it did forty or fifty years ago. Around its bare facts have grown the stories and associations which travel, friendship, reading have supplied. Loose threads have woven themselves into a web. A fact discovered yesterday is balanced by the history of two thousand years. Knowledge is no longer something learned in the study, but that is imbibed during one's wanderings through the world; not something which is contained in a book or books, but which in all lands and languages is part of the living speech and daily business of men, part of the common birthright of mankind.

The faculty of weaving wider and wider associations around our work and thoughts, and of thus enlarging the horizon of our minds, is helped by that sympathetic attitude and spirit of which a broad education has laid the first foundations. But again, the Muses are often kindest to those who have worshipped little at their shrine. It is common nowadays for clever schoolboys to spend many hours of every day in a chemical laboratory, from the age (say) of fourteen: an age at which we were learning Greek, and Plato's young Athenians were playing on the lute. It might be supposed that our young chemists were laying up for themselves what Talleyrand called "une triste vieillesse." By no means. So wonderful a thing is a schoolboy,

such a piece of work is a man, that our schoolboy-chemists are little the worse of their narrow and eccentric education. The learned chemist is still a learned man; in love and knowledge of the arts the chemists are scarcely beaten by the scholars. Not a few are steeped in the romantic history of their science, know what is to be known of ancient Greek and Egyptian chemistry, search out the medieval secrets of the poisoner, the alchemist, and the magician, and are versed in the Arabic and other recondite languages in which so many secrets are hid.

If it be an attribute or an end of culture to find something which shall take us out of our narrow lives, help us to forget the routine of our employments, and bring us in touch with the wide world, old and new, near and far away, to read history and poetry is a simple and time-honoured way; nor is there better history or poetry than that which the dead languages enshrine. Men who love these find them very helpful; they enable young men to see visions, they help old men to dream dreams.

A few months ago a scholar died, full of years and of honour, in whom science and the classics were very perfectly combined. Sir William Thiselton-Dyer was the acknowledged head of English botany; as botanist and gardener his influence went out into all lands, to the benefit of mankind, from the garden where he had the happiness to dwell; and all the while he was a true scholar, a Hellenist, acute, fastidious, and profound.

Thiselton-Dyer learned his Greek and Latin in a London day-school; so did I mine in Edinburgh—in that *Schola Nova* of Dunedin where my father had taught R. L. Stevenson and Andrew Lang and many another; had read the whole Aeneid through with them as beginners, and told them they were the first child-mariners who ever circumnavigated that noble poem. In seven years at school I never had a lesson in science, nor yet, I believe, had Dyer; but he and his companions, and I and mine, were botanists and naturalists in our teens. It was a Golden Age, when there were no scholarships to win, no examiners to satisfy. We had freedom to follow our bent, and leisure in which to teach ourselves.

If there was one school-book which Thiselton-Dyer loved more than another it was Virgil's "Georgics." Virgil never fails us, nor wearies us, nor does custom stale his infinite variety. The schoolboy thinks the "Georgics" an easy book; the old scholar knows it to be hard, finds in it *semper aliquid novi*, and is tantalised and fascinated by its difficulty. There is a line near the beginning about the "slow months" of the year, wherein Augustus found his heavenly habitation: "Anne novum tardis sidus te mensibus addas?" Halley the astronomer, coming to Martyn's help, explained the line by the brief statement that "Leo, Virgo, Libra, and Scorpio are really of slower ascension than the other eight signs of the Zodiack; to which Virgil no doubt alluded." But scholars

¹ From the presidential address delivered to the Classical Association, Cardiff, on April 9.

have been slow to accept an interpretation which seemed, as it seemed to Heyne, more subtle than poetic; and Conington declares that *tardus* "need be no more than a disparaging epithet, intended to exalt the power of Cæsar, who is to speed the year"! Dr. Fotheringham has given me a full explanation, on Halley's lines. The 'months' are signs of the zodiac, or the corresponding spaces which the sun travels over in a month. Owing to the obliquity of the ecliptic the signs, or the corresponding spaces of 30°, do not rise above the horizon in equal times. The calculation is somewhat technical, but the result is, briefly, that in the year 35 B.C. and the latitude of Naples, the four signs above-mentioned took each about 2½ hours to rise, while Aries and Pisces, at the other end of the scale, rose in about an hour and ten minutes. In other words, the signs round about the autumnal equinox took more than twice as long to rise as those about the vernal equinox; and the middle of the four 'slow months' lay precisely between Virgo and Libra or 'the Claws',—"Qua locus Erigonen inter, Chelasque sequentes, Panditur."

Dr. Fotheringham tells me another fact, which was quite new to me: namely, that what looks like, and is generally taken to be, a parallel passage in Manilius has an entirely different meaning: "Ne mirere moras, cum Sol adversa per astra Aestivum tardis attollit mensibus annum." This refers to the sun's 'anomalistic' motion, which is fastest at perihelion and slowest at aphelion; that is to say, in classical times it moved fastest in Capricorn and slowest in Cancer; and 'mensis' here means the monthly course of the sun. Now it so happened that the three signs in which the sun moved slowest, Gemini, Cancer and Leo, were precisely those in which (and in which alone) the zodiacal figures were depicted with the head or front towards the east. So Manilius frames the conceit that the sun moves slowly because these *astra* are adverse.

The naturalist, the botanist, and the astronomer, when they betake themselves to the classics, strive continually to interpret them: as generations of their kindred have been doing for five hundred years. Now and then a nail is set in a sure place; and the task continually advances, without ever coming to an end. Some day, but not yet, Greece herself will help us. Only of late has the botanist had a flora of Greece which he can depend upon; we are sadly ignorant of its fauna. We long especially for better knowledge of its vernacular names of beast and bird and plant and creeping thing, such as are proving of deep interest to the naturalist and the scholar in the multitudinous dialects of Italy.

The humblest task of the naturalist is the identification of species; but, both in biology and the classics, it lies at the root of the whole matter. If we do not know the flower of which a poet sings, we blunder the outline of his picture and miss his most delicate allusions. You remember, in the "Oedipus Coloneus", how the clustering flowers of the narcissus, ὁ καλλιβότρυς νάρκισσος, spring up under the dew of heaven, and make the μεγαλαῖν θεαῖν ἀρχαῖον στεφάνωμα—the time-honoured garland of

the Magnae Deae. My brother of our Greek chair brought me the passage only the other day, to ask me what flower νάρκισσος was; I told him (to begin with) that it was a *narcissus*, which is to say, a daffodil. But we may read, in the "Hymn to Demeter", how Proserpine was gathering narcissuses, when she, poor maid, "by gloomy Dis was gathered". I thought she had her little feet on the unbending corn, and poppies in her hair! How came she to be picking daffodils, when the autumn was come, and she must be stolen away and leave her earth-mother desolate and forlorn? The simple, pretty explanation is that we may find a tiny, late-flowering daffodil, Virgil's "sera coman-tem narcissum", growing in Greece and Italy, on the dry hills where there is no moisture but the dew; it flowers with the autumn crocus, Sophocles' χρυσαυγῆς κρίκος, and lasts until winter comes. Proserpine picked it with the last rose of summer and the crocuses, for her farewell nosegay; she took it down with her to Pluto's realm, and men call it her ἀρχαῖον στεφάνωμα.

Our daffodils have little or no perfume. But the old fifteenth-century traveller Busbequius, the same who brought the Constantinople Dioscorides to Vienna (which Sibthorpe went to Vienna to see), found our little autumn daffodil "miro odore fragrantem". When Proserpine picked her daffodil-nosegay, such a fragrant incense-smell went up that Heaven and earth and sea all laughed for joy:

κῆρυκε δ' ὀδυρῆ πᾶς τ' οὐρανὸς εὐρὺς ὑπερθε
γαῖα τε πᾶς ἐγέλασσε, καὶ ἄλμυρὸν οἶδμα θαλάσσης.

We miss something, if we say that narcissus means a daffodil—and pass on!

One of my father's colleagues in Ireland was J. F. Davis, who edited the "Eumenides"; he was a very learned but eccentric man. Going home on one of my undergraduate vacations from Cambridge, I met Davis in a Galway street; who cried out from afar off—it was his only greeting: "Can you tell me what plant Pliny's *Cassia* really was?" It happened that a German scholar had lately declared: "Quid Cassiae nomine veteres appellarint, nunquam divinabimur." Now when Virgil and Ovid speak of cassia, along with thyme and rosemary, they mean marjoram, and it is so depicted in the Vienna Dioscorides. Martial's *Cassia*, which was burnt for incense on a funeral pyre, was the Semitic name of a sort of cinnamon, brought home from India by the spice merchants. Early commentators mix up the poisonous Italian spurge-laurel (a sort of *Daphne*) with both of these; and Pliny mentions them, all three. If I had known as much as this fifty years ago, I might have given Davis a partial answer to his question. But Pliny also mentions a kindred spice or drug, an evil-smelling spikenard from the Ganges, which he calls *Ozaenitis*: a word which one would never doubt came from ὀζειν, 'to smell', if one did not know that so obvious a *Volksetymologie* was almost certain to be untrue. This strange name and substance Thielton-Dyer has ingeniously explained.

If we enlarge our knowledge of ancient geography by the help of Greek and Arab geographers, we may

follow, with delight and wonderment, the old trade routes known to Sindbad the Sailor, and to Solomon the King. The Periplus of the Red Sea leads us by one of these straight to the ancient city of Ozene, an entrepôt of the spice merchants. It has changed neither its name nor its commerce; it is the rich city of Ujjain, in Gwalior, the busy centre of the Indian opium trade. Dyer had the acumen to detect that *Ozaenitis* was spikenard from Ozene; just as in Dioscorides, *Mossulitis* was *Cassia* from Mossylon, the ancient haven hard by Cape Guardafui where the spice-merchants landed their costly bales—the “aromaticae species quas mittit Eous”.

When Carlyle was old he wished they had taught him the constellations when he was young, and “made him at home in the starry heavens”; and I too wish I had learned as a child to read the picture-book of the sky. It is an infinitely noble and exalted theme. It was the first art which grew into a science in the hands and minds of men. Some say it gave mankind a first glimpse of the divine; by man’s soul and by the stars of heaven Sextus the Mathematician declares that Aristotle found his way to God; and it is written that the firmament showeth his handiwork. The Greeks covered the sky with fairy-tales—“fabulis Graii complevere caelum,” said Martianus Capella; and Quintilian declares that no man can understand the poets if he be ignorant of astronomy—“nec si rationem siderum ignoret, poetas intelliget”.

On the threshold of this delightful study we are met by the cardinal fact that the panorama of the heavens is continually but very slowly changing; so that the heavens of which Aratus tells are not our heavens, and Homer’s pictures of the sky, though they are exquisitely true, are no longer to be seen by mortal men. For the heavens have their Great Year, in which each month of the twelve is 2000 years long, and a single day is threescore years and ten. Some hold this to be the true theme of the Fourth Eclogue. The Great Year, the Old Year, is drawing to its close when “Ultima Cumaei venit iam carminis aetas”; and anon, when “incipient magni procedere menses”, the Great Year begins anew. The Great Year and the precession of the equinoxes by which it is explained are doubly and trebly interesting to the classical scholar. Its discovery is commonly attributed to Hipparchus, and constitutes his title to immortality; this is a crucial argument of those who hold that the Greek genius was alone capable of transmuting crude barbarian knowledge into true science and wisdom. But the Assyriologists have lately found that this palmary discovery was made, at least essentially, two hundred years before Hipparchus, by Kidinnu, Pliny’s Kidenas, of Sippur in Chaldea; and the Babylonian astronomer has his place henceforth among the greatest of men.

Ulysses leaned on his long oar and watched the Pleiad and Boötes and the Bear—Boötes who sets so tardily, and the Bear who turns and turns about, and glares upon Orion, and never dips his feet in Ocean’s stream. But we who know that the Bear never sets in our northern sky, are surprised to find him setting like other stars, and by

no means ἄμυρος ὠκεανοῖο λοετρῶν, when we go to the Mediterranean or the Aegean. It is many a day of the Great Year since the Bears went dry-shod over the Aegean; but to tell just when they last did so is a simple matter, in the art or science of astronomical chronology. The Bear was ἄμυρος λοετρῶν ὠκεανοῖο in the Mediterranean about 800 or 900 B.C., and for some centuries before. Homer tells us that on the night in question Boötes, Orion, and the Pleiad were all visible together; and we may take it for granted that they formed a notable configuration, the place and season of which men were accustomed to observe. Ulysses was *navigating* by the stars; but why mention so many stars for such a simple thing? We glance nowadays up at the sky, find the Pointers, and follow them to the Pole-star in a moment. But in Ulysses’ time there was no pole-star, nor had there been one for hundreds of years!

Greek mariners steered by the Great Bear, and Tyrians by the Little Bear, but both alike were makeshifts, for neither Bear stood at the pole and neither could stand still. Only in some particular position would either of them give the true north, and that position must be defined by other stars. Suppose Ulysses out a-sailing one October night, about a thousand years before the coming of our Lord; a little before the dawn he saw Arcturus and the Pleiad, balancing one another as it were, one hanging above the eastern horizon, the other over the west. Down in the south-west Orion was shining, the Bear was watching him with his two bright eyes; just then these two eyes (which we call the Pointers) lay one to one side and one to the other of the meridian; and the Bear himself, body and tail, stretched away into the north-east from this meridian line. Ulysses looked at the Pointers and knew he was facing to the north; he then kept the Bear on his left hand, in the position in which *it then was*, and so steered to the south-west. He was on his course to Scheria.

The distinction between science and the classics vanishes away when we come to history, archaeology, or folklore, wherein the object of our study is mankind. Andrew Lang and a few others began to show us, a generation ago, how there was a science in the homeliest words and things, and the spirit of history in a game, an incantation, or a toy. In the “Pharmaceutria” of Theocritus we used to think the magic bird and magic wheel mere witchcraft, superstition, moonstruck madness—nothing more. Then came Andrew Lang and the others, to show the wealth of meaning in these unconsidered things. We have learned that the wheel still hums in the little hands of a Sicilian child; and that a kindred wheel roars its dull note in the hidden rites of the Australian bush. It thundered in the horrid feasts of Cretan Zagreus; it sounded amidst the roll of drums, as in darkest Africa, for Rhea and Bendys and Cotytto. Jason had it of Aphrodite, to bewitch Medea. The Sicilian calls it a cicada; the Greeks knew it by a bird’s name. All the Orphic mysteries, and who knows what more out of the dark religions of the

East, lie behind the story of the girl who sat under the Lady Moon a-singing: "Turn, wheel, turn, and fetch my own lad home to me."

When my father was writing of the dead languages, a dead civilisation had been but recently revealed; the chance-directed efforts of a traveller had shown the world that Nineveh and Babylon were "seats of tranquil learning and treasured science before ever a fleet had sailed from Aulis, or the eagles had promised empire to the watcher on the green Palatine". More than once since then has discovery repeated herself, raised up the ghost of empires which had gone down into the pit, and called from sepulchral palaces the long procession of the dead. To learn what Greece had of her science, her religion, her mysticism, her genius, her language, and her blood, from the civilisations by which her own was encompassed and preceded, is to my mind the greatest puzzle of history, the noblest problem for the scholar. Were I a younger man I should want above all things to know Egyptian, Assyrian, and Hittite, and all the rest of that pre-Hellenic apparatus of the scholar which the last century has half-revealed. I have been dreaming all my life of the riches of this Promised Land; a few grapes have been brought me from Eshcol—but I am come no farther than Mount Abarim.

When the wind blows from Assyria, it brings not only odours but also stray whispers to our ears. We remember how in the comedy of the "Birds" the two Athenians who pass by the hoopoe's dwelling on their way to the building of Cloud-

Cuckoo-Town, come laden with basket, earthen pot, and myrtle-twigs:

"Trudging along with basket, pot and myrtle,
To find some quiet easy-going spot,
Where we may settle down, and dwell in peace."

The scholiast, with the ignorance of his kind, explains this paraphernalia as so many useful implements for scaring away the birds. But now we learn that in an Assyrian text, from the library of King Assurbanipal, precisely these three things, a box (or basket), an earthen pot, and a myrtle spray are named, in the self-same order, as sacred utensils, to be used in connexion with *the founding of a city*. Such is the ray of light thrown by modern archæology on a single and apparently insignificant line!

"Caput inter nubila condit"—"her head is muffled from our sight"—was said of antiquity, as also of fame; and scholarship, like science, has her secrets to discover and her mysteries to explore.

Whether we be taught science or the classics in our boyhood is not the last word of all. But whichever of the twain it be, let us so learn it as to love it, and so love it that we may love it to the end:

ἀ δ' ἂν μάθῃ τις, τὰτα σόζεσθαι φιλεῖ πρὸς γῆρας.

Science and the classics! The one says (in Wisdom's words): They that eat of me shall yet be hungry. And the other says: They that drink of me shall yet be thirsty. And both alike continually enlarge our curiosity, and multiply our inlets to happiness.

The South Africa Meeting of the International Geological Congress.

THE High Court of geological opinion met for the first time in 1878 at Paris, with a membership of 310. Since that year there have been thirteen meetings, held at intervals of three years or so, at various capitals or other centres in Europe as well as in North and Central America; the long interval of nine years which separated the twelfth meeting in Canada during 1913 from the thirteenth session at Brussels in 1922 was due to the War and its aftermath.

The present century is witnessing a remarkable extension—in theory and practice—of the principle of internationalism in many branches of human endeavour; of this the pages of NATURE afford ample evidence. For the geologist extensive travelling is indispensable, and this is reflected in the steady growth in the number of those attending the sessions of the Congress; the record gathering of 742 geologists, representing some forty different nationalities, is a striking testimony of the extent to which world co-operation has grown in this science.

For its fifteenth session, the Congress meets during the last week of July and during August of this year in South Africa at the invitation of the Government of the Union, with its headquarters at Pretoria. The practical support from the Government as well as from the mining industry at Johannesburg and Kimberley, from munici-

palities and other public bodies and from various generous friends, has made it possible to arrange an attractive programme. This is the first occasion on which the Geological Congress has met in the southern hemisphere, and the exceptional opportunities which South Africa offers for the study of many fundamental problems of geology will make a strong appeal throughout the geological world. Though the Union of South Africa is not yet known with a degree of detail comparable with that reached in some older countries, where geological investigation—both official and private—has been carried on for much longer periods, enough has been accomplished to allow one important function of the Congress—the examination of the outstanding geological features of South Africa—to be carried out with profit and interest to the visiting members. Unfortunately, the great distances involved make heavy demands on the geologist's time and purse, but the efforts of the organising committee have met with a considerable measure of success, so that substantial concessions have been granted by the steamship lines and the South African railway administration.

The first main object of the Congress—to take stock of recent advances in geology—has, in accordance with the excellent practice established at previous meetings, enabled certain subjects to be placed in the foreground of the discussions. The