

our Consul at Barcelona, and enclose his reply. There have long been rumours of survivals of a dwarf or a prehistoric race existing in parts of Spain, but careful inquiries at Madrid failed to supply any definite information on the subject. Last summer on reading over an old number of *Kosmos* (Paris, 1887), I found a brief paragraph referring to a pigmy race having been found in the province of Gerona, Spain, who had slightly Mongolian eyes, yellow, broad, square faces, height from 1 m. 10 to 1 m. 15, and red hair.

An Austrian gentleman recently told me he had seen, in the market-place at Salamanca, some very under-sized peasants, with broad faces and mahogany-coloured woolly hair.

You will see that these accounts all agree substantially, and that these dwarfs and those of Africa are precisely similar.

I have got a deal of information from an old Spanish woman who belongs to a half-breed nano family, and who says that there are in such families frequently nanos (or "enanos") who have red tufts of wool, and are as small as ordinary small boys. But these tufts of wool are peculiarly characteristic of dwarf races nearly everywhere.

I shall write more fully as to my inquiries among half-breed nanos; but they are of very secondary interest now that we can find pure racial nanos within easy reach.

It is most fortunate that they live in the Valley of Ribas and the Col de Tosas, within a little more than a half-day's journey from Toulouse. Some health-seekers or tourists in the South of France may perhaps feel inclined to pay a visit to these little people.

Should the suggestion be acted on, and prove satisfactory, a line to myself on the subject, addressed to 28, Pall Mall, would be highly valued.

R. G. HALIBURTON.

Tangier, January 9.

[COPY.]

"British Consulate, Barcelona, December 10, 1892.

"DEAR SIR,—Since I received your letter of November 18 and its enclosures I have endeavoured to ascertain what truth there is in the statement that pigmies, or 'enanos' (not 'nanos') exist in the Valley of Ribas. From conversations I had with various individuals who have visited that district it appears certain that a race of men, of about from one metre to one metre and twenty centimetres high, of a darkish complexion (copper-coloured), dark hair and woolly, and flat, broad nose, live in that district, particularly in the 'Collado de Tosas.' They are active, and are generally employed as shepherds. It is also asserted that they are not very intelligent, and that they appear to understand and to make themselves understood with difficulty. It would be an easy journey to go to that place from this town. I had no little difficulty in finding out that such a race lived in that place, for many of the persons with whom I have spoken on the subject were evidently confused and confused me, as besides these, evidently racial pigmies, there are in that neighbourhood many 'cretins,' which were at times described to me as if these were the 'enanos' I spoke about. I am now certain that there are cretins and pigmies in the Valley of Ribas. It is stated that the 'enanos' are rapidly disappearing, and that latterly many have died of smallpox. The men you speak of, who were seen at Salamanca, are, I should say, natives of the Batuecas, or rather of Los Hurdes. These men were discovered in the sixteenth century, and they were then and are even now, in an almost absolute state of savagery." [The remainder as to this race is omitted, as it does not appear that they are nanos.—R. G. H.]

"Yours very truly,

(Signed) "Wm. McPHERSON.

"R. G. Haliburton, Esq."

British Earthworms.

I WRITE to suggest—in connection with the recent letters in NATURE upon this subject—that some one give a thoroughly trustworthy list of British earthworms, with the memoirs in which the species were originally described, and the chief characteristics of each. Dr. Benham would be doing very useful and acceptable work if he were to accomplish this. From what I understand everybody has been making mistakes, and the whole matter is in the utmost confusion. It is very necessary that

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such a classification should exist, if only for the benefit of those who are working on the earthworm more from a comparative anatomist's than from a specialist's point of view.

FRANK J. COLE.

Zoological Department, Edinburgh, January 12.

DANTE'S "QUÆSTIO DE AQUA ET TERRA."

"Quæstio Aurea ac perutilis edita per *Dantem Alagherium*, poetam florentinum clarissimum, de natura duorum elementorum Aquæ et Terræ disserentem."

"Lo, the past is hurled
In twain: up thrust, out staggering on the world,
Subsiding into shape, a darkness rears
Its outline, kindles at the core, appears
Verona."—R. BROWNING, "Sordello," Book i.

"TO all and each who shall see this document, *Dante Alighieri* of Florence, the least amongst true philosophers, wishes health in Him who is the Beginning of truth and the Light.

"Be it known unto ye all that whilst I was at Mantua there arose a certain question, the which after having been many times dilated upon rather for vain show than for Truth's sake, still remained undecided. Wherefore I, since from boyhood I have been nurtured continually in love of Truth, could not bear to leave the question undiscussed; but I thought fit to show the truth concerning it and to dissolve the arguments adduced to the contrary, both for love of Truth and hatred of Falsehood. And lest the malice of many who are wont to fabricate envious lies against the absent should behind my back alter what was well said, I have moreover thought fit to leave written down on paper what I proved, and to set forth the form of the whole disputation."

These are the words with which Dante commences this "golden and most useful" inquiry concerning the nature of the two elements, earth and water. The treatise is little known in comparison with the other writings of the poet;¹ but although rejected by Ugo Foscolo and others as "impostura indegna d'esame," its genuineness and importance are now almost universally admitted; and without yielding unreservedly to the enthusiastic opinion of an Italian geologist (Stoppani) that there are more truths relating to cosmology to be found prognosticated, affirmed, and even demonstrated in these few pages of the supreme poet than in all the writings of the middle ages taken together, we may nevertheless acknowledge it to be a work of the greatest interest and importance, and by no means unworthy of the singer of the "Divina Commedia."

It seems to be the last work of the poet's life, written at that period which he himself describes in his sonnet to Giovanni Quirino:—

"Lo Re, che merta i suoi servi a ristoro
Con abbondanza, e vince ogni misura,
Mi fa lasciare la fiera rancura,
E drizzar gli occhi al sommo consistoro
E qui pensando al glorioso coro
De' cittadini della cittade pura,
Laudando il Creatore, io creatura
Di più laudarlo sempre m'innamoro."
—Sonetto xlv. ed. Fraticelli."

Dante was at this time the guest of Guido Novello di Polenta at Ravenna. About the commencement of the

¹ It is, I believe, the only one of Dante's writings that has not yet been translated into English.

"The King by whose rich grace His servants be
With plenty beyond measure set to dwell,
Ordaims that I my bitter wrath dispel
And lift mine eyes to the great consistory;
Till, noting how in glorious quires agree
The citizens of that fair citadel,
To the Creator I, His creature, swell
Their song, and all their love possesses me."
—Rossetti's translation in "Dante and his Circle."

year 1320, he seems to have gone for some unknown reason to Mantua, and there to have entered upon this discussion, which he then completed at Verona. The disputation took place at this latter city on January 20, 1320, as Dante himself tells us, in the church of St. Helena (where in recent years the metropolitan chapter have put up a monument in commemoration of the event). All the clergy of Verona were present, except some few who, in the words of Rossetti—

“Grudged ghostly greeting to the man
By whom, though not of ghostly guild,
With Heaven and Hell men’s hearts were fill’d.”
—“Dante at Verona.”

From a passage which occurs in the course of the treatise, one might almost think that ladies also were present, but let not the reader therefore conclude that the assemblage which listened to Dante’s eloquence in that little Veronese temple resembled so many modern philanthropical and other associations in being chiefly composed of ladies and clergymen, for doubtless Can Grande della Scala himself was present to do honour to his former guest, and his poetic fame, which we know to have already spread far and wide, would certainly have brought together as many as the church could hold.

The question to be solved is whether, on any place on the earth’s surface, *water* is higher than the *earth*. This question, Dante tells us, was generally answered in the affirmative, and he gives us the five chief reasonings adduced in support of it, of which perhaps the most striking is this one:—

“If the earth were not lower than the water, the earth would be entirely without waters, at least in the uncovered part, and so there would be no fountains, nor rivers, nor lakes. So water must be higher than the earth. For water naturally flows downwards, and the sea is the source of all waters, and if the sea were not higher than the earth, the water would not flow to the earth, since in every natural motion the source of the water must be higher.”

Another is this:—“Water seems chiefly to follow the motion of the moon, as is evident in the flow and ebb of the sea, and therefore since the moon’s orbit is eccentric, it seems reasonable that water in its sphere should be eccentric too; and another argument shows that this cannot be unless it be also higher than the earth.”

Such be their arguments, but sense and reason alike are against them, and Dante proceeds to explain how he will treat the question. First, he will prove that it is impossible that water in any part of its circumference be higher than this emergent or uncovered earth on which we dwell. Secondly, he will prove that this emergent earth is everywhere higher than the surface of the sea. Thirdly, he will urge arguments against his own demonstrations, and then demolish these objections. Fourthly, the final and efficient cause of the elevation and emergence of the earth will be shown. Fifthly, he will demolish the five chief arguments of the other side which he has already stated.

1. It is impossible that water in any part of its circumference be higher than the earth.

There are only two ways whereby water can thus be higher than the earth: either the water must be *eccentric*, or, if it be *concentric* with the earth, it must be *gibbous* in some part. By water being *eccentric*, Dante means the centre of its natural sphere to be out of and different from the centre of the earth; by being *gibbous*, Dante means some part of its sphere to be raised up so as to form a protuberance or hump, just as he considers the earth on which we live to be a protuberance or gibbosity of the spherical surface of the earth.

He now shows by means of diagrams that neither of these things are possible, but first makes these two statements—(1) Water naturally flows downwards; (2) Water

is by nature a labile body and has not a boundary of its own, but takes the boundary of the thing in which it is contained.¹

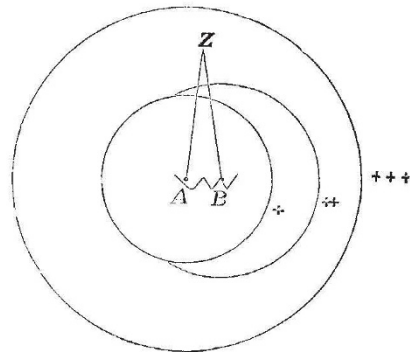
We may compare with this a modern definition of a fluid:—

“A perfect fluid is a body whose form can be changed to any extent, provided its volume remain constant, by the application of a stress, however small, if we allow it sufficient time.”—Garnett, “Treatise on Heat.”

In the first place, *water cannot be eccentric*.

For if it were so, then three impossibilities would follow—(1) Water would naturally flow both upwards and downwards; (2) water would not be moved downwards by the same line as the earth; (3) an equivocation would arise in speaking of the *gravity* of water and of earth; all which things are seen to be not only false but impossible.

The demonstration *ab absurdo* follows thus:—Let the heavens be the circumference on which are placed three crosses; water the circumference on which are two; earth the circumference on which is one cross.



Let the centre of heaven and earth be at point A, the centre of water at point B. Thus A, being the centre of the universe, is the lowest spot of all, and everything which has in the world a position alien from A must be higher. Now if there be any water at A and the way be open to it, it will naturally flow to its own centre, B, since it is the property of every heavy body to move to the centre of its own sphere. But the motion from A to B is a motion upwards; therefore water will flow *upwards*, which is impossible.

Again, let there be at Z a lump of earth and some water, and let there be nothing to hinder. Then, since it is the property of every heavy body to move to the centre of its own sphere or circumference, the *earth* will move in a straight line to A, and the *water* in a straight line to B, and this, from the figure, must needs be along different lines. This, says Dante, is not only impossible, but would make Aristotle laugh if he were to hear it.

The third impossibility follows thus:—*Gravity* and *levity* are “passions” of simple bodies which are moved with linear motion, and *light* bodies tend upwards and *heavy* tend downwards, by “heavy” and “light” being meant that which has the power of being moved. If now water moved to B and earth to A, since these are simple bodies and heavy, they will be moved down to different centres. If this were so, the word *gravity* would have an *absolute* signification with respect to earth and *relative* with respect to water. This is what the argument amounts to, and so there would be an equivocation of meaning in the word “gravity.”

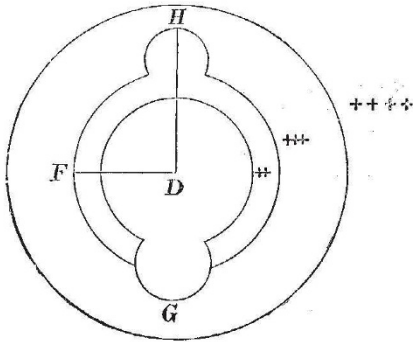
Therefore, *ab absurdo*, water in its natural circumference is not eccentric or out of the centre common to the circumference of the earth.

In the second place, *water cannot be gibbous*.

¹ “Aqua est labile corpus naturaliter, et non terminabile termino proprio.”
—§ xi.

Let the heavens be where are four crosses, the water where three, the earth where there are two.

Let D be the centre of *earth* and concentric *water* and *heaven*. Water cannot be concentric with the earth unless the earth be in some part "gibbous" above the central circumference. Let the protuberance of the earth be at G, and at some part of the circumference of water let there be a protuberance of water at H. Then let a line be drawn from D to H and another from D to F; it is manifest



that DH is longer than DF, and therefore the summit of one is higher than the summit of the other. Since both touch at their summit the surface of the water without passing beyond, it is clear that the water of the protuberance will be higher, with regard to the surface where F is. Since, therefore, there is no obstacle, the water of the protuberance will flow down until it become level at D with the central or regular circumference. And thus it will be impossible for a protuberance of water to last or even to exist.—Q.E.D.

Dante now brings forward a subsidiary argument to show that probably water has no protuberance out of the regular circumference. The protuberance of the earth is sufficient to prove and explain everything, and "Quod potest fieri per unum, melius est fieri per unum quam per plura." So there is no protuberance on the surface of the water, because God and Nature always do what is best and do not work in vain.

Since water cannot be eccentric, as was shown by the first figure, nor concentric with a protuberance, as was shown by the second figure, it is necessary that water be concentric and coequal, *i.e.* equally distant in every part of its circumference from the centre of the world.

Thus it has been proved impossible for water in any part of its circumference to be higher than the surface of the earth; and so the first point is completed.

We now pass on to the second.

2. This emergent earth is everywhere higher than the surface of the sea. This is shown in this way:—

All the shores of the ocean, as well as of the Mediterranean seas, rise above the surface of the sea which bounds them, as is clear to the eye. Therefore all the shores are further from the centre of the world, since the centre of the world is also the centre of the sea and the shoreward surfaces are parts of the whole surface of the sea; and since everything that is more remote from the centre of the world is also more high, it follows that the shores everywhere rise above the surface of the sea. And if the shores are higher than the sea, much more must be the other regions of the earth, since the shores are the lower parts of the earth, as we see by the rivers flowing down to them.

3. In accordance with the order of the question as at first stated by Dante, he now brings forward various arguments which seem to contradict his demonstrations, and these arguments he then proceeds to demolish. They need not detain us here. In the course of the operation there occurs a most interesting distinction between *homo-*

geneous and *simple* bodies, in which I seem to see a distinct foreshadowing of our modern view of the chemical elements in contradistinction to the ordinary four or five elements of Aristotle and his followers. "Corpora enim homogenea et simplicia sunt; *homogenea ut aurum depuratatum; et corpora simplicia, ut ignis et terra.*" § xviii.

But perhaps it might not be out of place to quote here the following passage from G. H. Lewes's "Aristotle":—"One of the great difficulties in interpreting ancient opinions is to guard against the tendency of reading our fulness of knowledge into their vague expressions. We often find in ancient works the precious metal we have ourselves brought with us; as the alchemist often unconsciously put into his crucible the gold, which he afterwards discovered there with surprised delight."—G. H. Lewes, "Aristotle," x. § 170.

He thus sets forth the *final* cause of the elevation or emergence of the earth: There must needs be a part in the universe where all *miscibilia*—to wit, elements—can come together; this cannot be unless the earth be in some part emergent. Thus, although earth, according to its own nature, tends always downwards, it has in it another nature by which it obeys the intention of Universal Nature, and allows itself to be here and there raised up, in order that mixture of the elements may be possible, and thence all things that are subject to generation and corruption may be formed.

He further shows that the emergent earth on which we dwell has the form of a semilune, by arguments which he graciously tells us that even ladies can follow—"Manifestum esse potest etiam mulieribus."

4. What now is the *efficient* cause of the elevation or emergence of the earth above the surface of the water?

Dante first shows that neither the *earth* itself, nor *water*, nor *air*, nor *fire* can be the efficient cause. Therefore it must be referred to the *heavens*. But there are many heavens, and to which are we to refer it? Dante shows that it cannot be referred to the *moon*, nor to the heavens of any of the planets (Mercury, Venus, the Sun, Mars, Jupiter, Saturn), nor yet to the Crystalline Heaven or *Primum Mobile*, the 9th sphere. Now, since the only mobile bodies which remain are the Heaven of the Stars, *Cœlum Stellatum*, or 8th circle, we must refer the cause of the elevation of the earth of our hemisphere to that. This Heaven of the Stars has at once unity in substance and multiplicity in its virtues or influences, as the poet himself sings:—

" Il ciel, cui tanti lumi fanno bello,
Dalla mente profonda che lui volve
Prende l'immagine, e fassene suggello.
E come l'alma dentro a vostra polve,
Per differenti membra, e conformate
A diverse potenzie, si risolve;
Così l'intelligenza sua bontate
Moltiplicata per le stelle spiega,
Girando se sovra sua unitate."

—"Paradiso," ii. 130-138.¹

Dante further refers the elevation of our earth to that region of the *Cœlum Stellatum* which roofs over this uncovered earth; that is, that this elevating virtue or influence is in those stars which are in the region of the heaven, which is bounded by the equator and the circle which the pole of the zodiac describes around the pole of the world; "whether it elevate by way of attraction as

¹ "The heaven, which lights so manifold make fair,
From the Intelligence profound, which turns it,
The image takes, and makes of it a seal,
And even as the soul within your dust
Through members different and accommodated
To faculties diverse expands itself,
So likewise this Intelligence diffuses
Its virtue multiplied among the stars,
Itself revolving on its unity."
—"Paradiso," ii. 130-138, Longfellow's trans.

the magnet draws the iron, or by way of impulsion, generating impelling vapours, as in certain mountains." A truly scientific and most suggestive remark!

We may compare the last clause with those well-known lines of the "Inferno," in which is described how the earth, and likewise the mountain of Purgatory were formed when Lucifer fell from Heaven:—

"Da questa parte cadde giù dal cielo;
E la terra, che pria di qua si sporse,
Per paura di lui fe del mar velo,
E venne all'emisperio nostro: e forse
Per fuggir lui, lasciò qui il luogo voto
Quella ch'appar di qua, e su ricorse."
—"Inferno," xxxiv. 121-126.¹

But now it may be asked, Since that region of the heaven moveth circlewise, why did not this elevation happen circlewise? Because, Dante answers, the matter was not sufficient for so great an elevation. Then why was the elevation of the earth produced in our hemisphere rather than in the other? To this, says Dante, we must answer as Aristotle does (in "De Cælo," book ii.) in answer to the question why the heavens move from east to west and not contrariwise, that such questions proceed either from much folly or from much presumption, because they are above our intellect. God made all things for the best, and when He said, "Congregentur aquæ in locum unum et appareat arida," then were the heavens virtuated to act and the earth potentiated to be passive.

"Let therefore men cease," cries Dante, "yea, cease from inquiring into those things which are above their intellect, and let them strive to the utmost of their power to raise themselves to things immortal and divine, and so leave those things which exceed their understanding. Let them listen to Job:—Numquid vestigia Dei comprehendes, et omnipotentem usque ad perfectionem reperies." (Job xi. 7.) Let them hearken to the words of the Psalmist: 'Mirabilis facta est scientia tua; et me confortatus est, et non potero ad eam.'—(Ps. cxxxviii.) Let them hear Isaiah speaking in the person of God to man: 'Quam distant cæli a terra, tantum distant viæ meæ a viis vestris.'—(Is. lv. 9.) Let them hear the voice of the Apostle to the Romans: 'O altitudo divitiarum scientiæ et sapientiæ Dei! quam incomprehensibilia judicia ejus, et investigabiles viæ ejus!'—(Rom. xi. 33.) Lastly, let them hearken to the very voice of the Creator, saying: 'Quo Ego vado, vos non potestis venire.'—(S. John vii. 34.) And let these things suffice for the inquiry of the truth before us."

We may most fittingly compare this Dantesque passage with the close of Galileo Galilei's famous "Dialogo intorno ai due massimi sistemi del mondo, tolemaico e copernicano," which I here venture to translate:—

"*Simplicio*. If either of you were asked, If God in His infinite power and wisdom could confer upon the element of water the reciprocal movement which we perceive in it, in another way than by the moving of the vessel containing it, I know that you would answer, that He could have done so in many ways, even unimaginable by our intellect; whence I immediately conclude that, this being so, it would be excessive daring for any one to wish to limit and restrict the Divine power and wisdom to a particular phantasy of his own.

"*Salviati*. An admirable and truly angelical doctrine, to which very conformably answers that other divine doctrine, which, whilst it allows us to dispute about the constitution of the world, adds (perhaps in order that the

¹ "Upon this side he fell down out of heaven;
And all the land, that whilom here emerged,
For fear of him made of the sea a veil,
And came to our hemisphere; and peradventure
To flee from him, what on this side appears
Left the place vacant here, and back recoiled."
—"Inferno," xxxiv. 121-126, Longfellow's trans.

exercise of human minds be not suppressed nor grow lazy) that we are not to find out the work of His hands. Let therefore the exercise permitted and ordained to us by God make us recognize and so much the more wonder at His greatness, as we find ourselves the less competent to penetrate into the profound abysses of His infinite wisdom.

"*Sagredo*. And this will serve for the last conclusion of our four days' argument."—Galileo Galilei, "Dialogo dei Massimi Sistemi, Giornata quarta."

Dante now briefly deals with the five arguments which he mentioned at the beginning of his treatise as the most important against his theory. These being made short work of, he concludes:—

"This philosophical question was determined by me, Dante Alighieri, the least of philosophers, beneath the sway of that invincible lord, Messer Cane Grande della Scala, for the holy Roman empire, in the illustrious city of Verona, in the church of S. Helena, and in the presence of all the Veronese clergy, save some few who, aflame with too much charity, do not admit the postulates of others, and through virtue of humility poor of the Holy Spirit, shun being present at their discourses, lest they may seem to approve their excellence.

"Now this was done in the year from the Nativity of our Lord Jesus Christ, 1320, on Sunday, which the Saviour enjoined on us to venerate for His glorious Nativity and His wondrous Resurrection. The which day was the 7th from the ides of January and the 13th before the calends of February" (*i.e.* January 20).

I have dealt merely with the chief parts of this Dantesque dissertation. According to Signor A. Stoppani ("La questione dell'Acqua e della Terra di Dante Alighieri," in "opp. Lat. di Dante," ed. Giuliani, vol. ii.) there are nine truths relating to cosmology, presaged, affirmed, and in part demonstrated. These nine he makes out thus:—

- (1) The moon the principal cause of tides.
- (2) Equality of the sea's level.
- (3) Centripetal force.
- (4) Sphericity of the earth.
- (5) Dry land simply protuberance of the earth's surface.
- (6) Northern grouping together of the continents.
- (7) Universal attraction.
- (8) Elasticity of vapours a motive power.
- (9) Heaving up of the continents.

Let me now add a tenth: A vague foreshadowing of our modern idea of chemical elements as distinct from those of Aristotle, or at least of homogeneous chemical bodies; "Corpora enim homogenea et simplicia sunt; homogenea, ut aurum depuratum; et corpora simplicia, ut ignis et terra." EDMUND G. GARDNER.

Caius College, Cambridge.

MOROCCO.¹

MOROCCO has a paradoxical place in the history of exploration; although the only part of Africa fully in sight from the shores of Europe, and dotted with one or two half European coast towns, its interior is more firmly closed to the traveller, sportsman, and missionary than the dense forests of the Congo, or even the shores of Lake Chad. The difficulties in the way are not physical, nor are they wholly political. They arise mainly from the deeply-rooted antagonism in race and creed between the inhabitants of Morocco and all Christendom—this quaint and semi-fossil phrase is still here a necessary and sufficient term. At this moment public atten-

¹ "Bibliography of the Barbary States." Part IV. A Bibliography of Morocco from the earliest times to the end of 1891. By Lieut.-Col. Sir R. Lambert Playfair and Dr. Robert Brown.