

the coasts of Tierra del Fuego, the Falkland islands, and South Georgia.* It would be interesting to know if it also lives round the South Sandwich islands. I do not know if the Scottish South Polar Expedition has found the *Macrocyttis* in the South Orkneys, but I should think not.† Other characteristic algæ are the Lessonias.

The Antarctic vegetation is characterized by the total absence of a type with floating fronds (except the *Marginaria jaquinoti* (Mont.), floating when torn off from the bottom). Such a type would be quite inconsistent with the ice-conditions. The vegetation of the beach is influenced in its character by the ice-floes always grinding against the stones, and has been forced to retire into the small basins, where the ice-floes cannot come. Giant algæ are not at all wanting, especially the *Desmarestias*, but in a greater depth. Here, as in more northern shores, calcareous algæ form an important part of the vegetation.

The extension of the Austral and Antarctic zones into the Indian and Pacific oceans has not been referred to here. As botanically Antarctic lands we perhaps ought to consider Enderby and Kemp Land, the different parts of Wilkes Land, Victoria Land with Balleny islands, and Alexander Land with the Biscoe islands. Austral lands are Bouvet island, Prince Edward and Crozet islands, Kerguelen, MacDonal and Heard islands, New Zealand and Antipode, Chatham, Auckland, Campbell, Macquarie, and Emerald islands.

The northern limit of Austral vegetation seems to me difficult to define. I think that the 40° S., of course with some deviations to the north or south, more or less limits it. To this question, as well as to the circumpolar extension of Austral vegetation, I shall return another time.

GRUEBER AND DORVILLE'S JOURNEY ACROSS TIBET.

To the Berlin *Zeitschrift der Gesellschaft für Erdkunde* for 1904, No. 5, Herr R. Tronnier contributes a monograph on the journey made in 1661 across Tibet by the Jesuits, Johannes Grueber and Albert de Dorville. Subjoined is a summary of the results.

The object of the present study is to vindicate for the German, Johannes Grueber, the place to which he seems entitled in the history of geographical progress, but which has certainly not hitherto been conceded to him. He is certainly not the first European that crossed Tibet, as Odorico de Pordenone's journey shortly before 1330 can scarcely be called in doubt. But he is the first who brought back with him a genuine record of the land and its people. Although a Jesuit, he did not go to Lhasa as a missionary like his precursor and his immediate successors; he went on a real geographical mission, imposed by the necessity of finding a new home route to Europe, a route which at the time was supposed to be still untraced.

Authentic documents referring to the journey are not very numerous. They comprise five of Grueber's letters, a Latin report of the Jesuit, Athanasius Kircher, and lastly a long Italian "Relazione" by an uncertain author. The chief difficulty in reconstructing the journey lies in the fact that these scanty materials present great discrepancies, to reconcile which, where at all possible, is the purpose of this essay.

Grueber's Letters.—I. The earliest extant, dated from Surat (India), March 7,

* Skottsberg, "Några ord om *Macrocyttis pyrifera*," *Bot. Notiser*, 1903, No. 2.

† Since this was written, I learn that the Scottish Expedition has reported three mosses, six lichens, and some algæ from the South Orkneys, but not *Macrocyttis*.

1658, is written in German, and addressed to the Rev. Father John Haffenecker, rector of the Jesuits' College and University of Graetz in Styria.

II. The second, which, like all the rest, is in Latin, follows a now lost short communication to the same address, and is undated, but was sent to P. Joannes Gamaus, S.J., in Aschaffenburg from Rome shortly before starting on his second journey, hence apparently about the beginning of 1664. It is by far the most important of all his letters on his journey through Tibet.

III. is dated May 10, 1664, from Venice to Kircher, after starting on his second journey. It contains a copy of another undated letter from P. Ferdinand Verbiest, which Grueber had received in Singanfu after his departure from Pekin (1661).

IV. and V. are replies to a distinguished acquaintance of unknown name and address, on all kind of things connected with the journey. IV. was written in Danzig on December 11, 1664; V. in Breslau on March 14, 1668.

As far as known, Letter I. occurs first in the collection 'Der Neue Welt-Bott' (Augsburg and Graetz, 1726), No. 34; II., IV., V. in Thévenot's 'Divers Voyages Curieux,' but apparently not in all editions. III. is found in Kircher's 'China Illustrata' (Amsterdam, 1667), pp. 222 sq.

'Illustrata,' pars. ii., cap. iii. § 2, and cap. iv. (pp. 64-77). Here is also given a "Carta Geodoborica," a route-map, which, however, presents a very confused picture of the line of march.

The Italian Relazione.—The origin of this document will be explained in our biographical notice, and here it will suffice to give the main result. Grueber's interview with the two Italians took place in Florence on January 30, 1666 (New Style). It is scarcely surprising that errors should occur in a narrative written down after a conversation of several hours' duration; hence it can only be accepted with a certain reserve.

The Relazione was first printed by Thévenot (*op. cit.*) as the 'Viaggio del P. Giovanni Grueber tornando per terra da China in Europa.'

For the lives of both travellers two documents have been brought to light, which, though short, are authentic. (1) Ph. Couplet, 'Catalogus Patrum Soc. Jes.' (1686), where reference is made to both under Nos. 74 (p. 39) and 81 (p. 43); (2) On Grueber alone valuable information is supplied by Carlos Sommervogel in 'Bibliothèque de la Compagnie de Jésus' (Première Partie: "Bibliographie"), (Brussels, Paris, 1892, vol. iii.).

Albert de Dorville (ob. 1662).—This is undoubtedly his correct name, although called Alb. de Bonville by Grueber in his Letter II. It occurs at least seven times in Kircher's 'China Illustrata,' and also in the 'Catalogus.' He was born in Belgium (date of birth unknown), and went in 1657 to China, where he laboured as a missionary in Shansi. Grueber mentions him (Letter II.) as former associate of P. Martinus Martini, procurator of the order in China and editor of the 'Novus Atlas Sinensis' (1655). In 1661 he was sent back to Europe with Grueber, but next year succumbed to the hardships of the journey in Agra.

Johannes Grueber (1623-1684).—This is the generally current form, though the 'Catalogus' write Greuber (for Grüber?), while the Latin is Gruberus. He was an Austrian-German, born at Linz, on the Danube, October 28, 1623, and received into the order October 13, 1641; went to China as a missionary in 1656, the route followed being from Rome through Asia Minor, Armenia, Persia, and Ormuz to Surat, where he stayed at least ten months, and in December, 1657, observed a lunar eclipse with a view to fixing a longitude (Letter III.). According to Letter I., he intended in a few days (counting from March 7, 1658) to sail in an English vessel for Macao, but, owing to local troubles, did not reach China till 1659.

From Macao Grueber was summoned as mathematical assistant to the court of

Pekin, where he held this position for two years (1659-1661). After the death (February, 1661) of the emperor Shunchi, first of the Manchu dynasty, Grueber was recalled "to receive instructions from the General of the Order at Rome" (Markham), de Dorville being chosen to accompany him on the return journey. As Macao was just then being blockaded by the Dutch, the two Jesuits were instructed to discover, if possible, some shorter overland route to Europe, such as was supposed at that time to have never yet been opened. The travellers now left Peking for Singanfu and Siningfu, whence they made their way through Lhasa to Agra. Here Grueber lost his fellow-traveller (see above), but continued the homeward journey with Henricus Roth, who had been stationed for nine years in Delhi. According to the *Relazione*, he went from Agra in seven days to Teli (Delhi), thence in fourteen days to Lahore, and thence to Multan, where he embarked, and in forty days reached Tata at the head of the Indus delta, where he met many English and Dutch traders. After a short delay, he continued the journey by land through Maccaran (Mekran) and Cape Caramania (Kirman) to Cape Jax (Jask) and Ormuz. From Ormuz he again followed the main highway to Smyrna, where he took ship for Messina and Rome. Here he handed his memoranda to Kircher for publication, on the condition that everything was to be included in one volume.

Soon after Grueber was ordered to return to China, and on May 10, 1664, he was already in Venice (Letter III.), evidently on his way to Vienna, as this time he was to take the overland route through Russia to China. After writing Letter IV. (December 11, 1664) at Danzig, he went to Mitau, near Riga, the court of the Duke of Courland, who informed him that news had just come in from the Grand Duke of Moscow that the road to Astrakhan was blocked by the Tatars, at that time allies of Poland against Russia (Letter V.). Grueber had therefore to give up his project, and returned through Breslau to Vienna, whence he accompanied the emperor's envoy, Count Lesle (Lesly) to Constantinople, with the intention of again striking the old overland route eastwards. But here he suddenly fell ill, and, being unable to continue his journey, returned by sea to Leghorn for Florence. Here he had a long interview with Carlo Dati and the author of the Italian *Relazione* on January 30, 1666, New Style, which answers within a day to the "31 Gennajo 1665 al Incarnazione," the date borne by this document.

Little more is known of the life of Grueber. At the time of the interview he was still under orders to return to China, but does not appear to have done so. Markham states that "Grueber died in 1665 on his way back to China," that is, 1665 Old Style = 1666, as above seen. But even so this date cannot be accepted, and credence must be given to the statement of the 'Catalogus' that Grueber died in 1684, not on his way East, but in Germany.

ACROSS TIBET.

From Peking to Sining.—Our travellers left Peking on April 13, 1661, as stated by Grueber in Letter II.: "Discessi à Sinis Pequino 13 Aprilis 1661." Kircher writes in his barbarous Latin, "Ex Pequino itaque hi Patres anno 1661, mense Junio, in Siganfu triginta dierum et hinc Sining sive Sininfu, totidem fere dierum decursu transacto his croceo flumine, quod Hoang vocant, transitu, confecerunt iter." Hence Astley's "he left Peking in the month of June," referring "mense Junio" to "ex Pequino" instead of to "confecerunt iter." All agree that Singan was reached in thirty days, and Sining in another thirty days, so that the section of the journey in China proper took altogether two months. In Singan they probably stopped a few days, since here Grueber received the above-mentioned letter from P. Verbiest, which, as shown by the contents, was written at the earliest four or five days after the travellers had left Peking; cf. also the address:

"Ad Gruberum in Singanfu commorantem." In Sining, again, they must have waited some time for a suitable caravan; hence the somewhat full description of this important mart and its surroundings, with the determination of its latitude, although the reference to the Great Wall is not very clear. According to Peschel and Markham, the stay in both cities should be estimated altogether at one month. For the whole journey from Peking to Lhasa they allow six months, of which two, as seen, from Peking to Sining, and three, as we shall see, from Sining to Lhasa, leaving one for the delays in China proper. But this six months is nowhere clearly given, and unless it be a simple error it may have been arrived at on the following calculation. Kircher gives, as the duration of the whole journey from Peking to Agra, fourteen months; and Grueber (Letter III.) eleven months "after leaving China." Thus the Chinese section would be $14 - 11 = 3$ months, that is, the two *en route* and the one of detention, as above.

From Sining to Lhasa.—With Sining begins the most interesting, but at the same time, for us, the least-known section of the journey. From this place to Lhasa there are two main routes. One, the "old" highway, as it is called on Sven Hedin's large map (*Petermanns Mitt. Supplement*, 131, 1900), leads from Sining south-westwards straight to the large lacustrine sources of the Hoang-ho, crosses the Di-chu at Tatsando, and south of the Tanla range joins the other route. This second road runs from Sining west to the Kuku-Nor, skirts it north and south, crosses the south Kuku-Nor range, and traverses the Tsaidam plain to Daun-Saasak. Here it ramifies, one branch immediately surmounting the ranges in a south-west direction, the other trending first westwards along their foot, and then bending southwards. At the confluence of the Naphitai-ulan-muren with the Murussu (Di-ohn) the east branch again ramifies; one line, crossing the headwaters of the river, amongst them the Toktonai-ulan-muren, joins the west route, while the other at once crosses the Murussu and continues to run east of the river. Both branches again unite south of the Tanla range, and then follow the same track as the first route all the way to Lhasa.

In order the better to understand which of these routes was actually taken, here are juxtaposed the pertinent passages from the extant documents—

Grueber (Letter II.) ¹	Kircher ("China Illustrata").	The Ital. Relazione.
<p>"... Inde (Sining) egressus transivi trium mensium spatio Tartariam adeo desertam... Tertio mense attigimus regnum Baranataka. . . ."</p>	<p>P. 65.—"A Sining trimestri spatio per Kalmack Tartariæ desertam, usque ad initium Regni Lassa quod et Barantola Tartari vocant, pervenerunt. . . . P. 67.—Egressi itaque hanc stupendi muri vastitatem dioti Patres, statim rivum piscibus refertum obviam invenerunt. . . . transit quoque flumine croceo (Hoang) extra muros, statim vastissimum illud desertum Kalmack. . . . ingressi, ad Barantolæ Regnum usque trimestri spatio confecerunt. . . ."</p>	<p>P. 2.—"Essendo egli di China entrato nelle arene della Tartaria deserta, e quella attraversata in tre giorni arrivò alle spiagge di Kokonor. Questo è un mare simile al Caspio di donde ha l'origine il fiume Giallo. . . . Kokonor dunque significa in lingua Tartara Mar grande, dalle rive del quale successivamente discostandosi il Padre entrò in terra Toktokai. . . . Per questa terra passa il fiume Toktokai da cui prende il nome; bellissimo fiume e sull' andare del Danubio, se non che ha pochissimo fondo, e un' uomo a cavallo lo passa francamente a guado. . . . Quindi inoltratosi nel paese di Tangut arrivò in Retink, provincia assai popolata del Regno di Barantola, e finalmente del Regno detto propriamente Barantola. . . ."</p>

A comparison of these records shows clearly that the section between Sining and Lhasa took about three months. This of itself may be important when taken in connection with the following passage from P. Desideri (Lhasa, 1716-22), which occurs in the *Nouveau Journal Asiatique* (Paris, 1831), vol. viii. p. 130: "De Lhasa à Sining il y a deux routes. L'une, de 4 mois, passe par des pays inhabités; l'autre par le désert, n'est que de 3 mois; elle est plus à l'ouest et au nord, et coupe le désert en droiture." This, of course, cannot be taken absolutely, since the caravans move at very different rates of speed. Still, the statement gives us a first safe standpoint. But Grueber says too little, while Kiroher tells us that just beyond the "wall" they came upon a river abounding in fish, and also beyond the "wall" crossed the Hoang to enter the "Kalmack desert" (?), statements which are duly entered on his hopelessly confused "route-map," but must remain unintelligible to us. The alleged second crossing of the Hoang-ho can fit in with the "old" route only by taking "extra muros" in a very wide sense, and placing the crossing somewhere between the Oring and the Charing-nor. But this would again be scarcely admissible, since the "Kalmack desert" is not entered till after that crossing.

In the much fuller *Relazione*, the travellers, after leaving China, traversed the Tartar desert to the Kuku-nor in three days. Then they reached Barantola (Lhasa) through the Toktokai district and the province of Retink, the *Relazione* here giving relatively ample descriptions, for instance, of the Kuku-nor and of the Koktokai river. Why did Grueber and his editor Kiroher pass these things over in silence? But, as such details cannot have dropped from the clouds, we must still assume that they were obtained by the author of the *Relazione* from Grueber. Only then three points will have to be rectified: (1) Kuku-nor does not mean the "Great," but the "Blue," lake; (2) it cannot be compared with the Caspian, which is about a hundred times larger; (3) nor is it the source of the "Fiume Giallo" (Hoang-ho). Although these statements are wrong, they still show that Grueber was aware that the river trended a long way to the west from Lanchau. Nor will any one infer anything in favour of the "old" route from his statement regarding a "lacustrine source" of the Hoang-ho. On the other hand, it may presumably be inferred that Grueber skirted the Kuku-nor, not on the south side, where, according to Stieler's latest map, the main highway runs, but on the north side, and had thus no opportunity of correcting his mistake regarding the Hoang-ho. And Prjevalski tells that caravans even still take the north side of the lake (*Petermanns Mitt.*, 1876, p. 167).

All this points to the western as the more probable route, and it may even be inferred that the "old" road was already at that time little used. Our travellers' itinerary would thus coincide here with that of Huc and Gabet (1845-46), who also followed the north side of Kuku-nor. Then the further section as far as Daun-sassak can be anticipated, and, indeed, is laid down on the maps. But at Daun-sassak fresh difficulties arise, as here begins the above-mentioned forking.

According to the *Relazione*—the other records are silent—the travellers now entered the Toktokai district, supposed to be so named from the Toktokai river. Where is this district to be sought? Markham and von Richthofen point out that one of the headwaters or left tributaries of the upper Yangtse (Murussu) is the Toktonai-ulan-muren, which might perhaps be brought into this connection. It was above seen that this river is crossed by one caravan route west of the Murussu. But, however tempting the conjecture, it cannot be accepted. According to Prjevalski (quoted by St. Martin *s.v.* Yangtse), the Toktonai-ulan-muren is only 20 to 30 metres wide at its junction with the Murussu, which is here 60 to 80 metres wide, but fordable. On the other hand, Grueber's Toktokai is spoken of as a very

fine river, broad as the Danube, although (at that season) easily fordable on horseback. Von Richthofen rightly assumes that the breadth here meant is that of the Danube at Linz, Grueber's birthplace, where the bridge is about 200 metres long—that is, ten times that of the Toktonai. Nor does one quite see why a large province should be called after a small river, or why Grueber should not have mentioned the more northerly and much more important Napohitai-ulan-muren, or the central mainstream (Murussu) itself. That this last was really meant seems almost certain from these and further considerations. The pundit A. K. once gives the alternative name "Thokto" to the upper Murussu (*Petermanns Mitt.*, 1885, plate i.), while Grueber's statement as to the breadth of the river agrees remarkably well with that given by Prjevalski for the Murussu (Di-chu) at the Napchitai-ulan-muren confluence—that is, just where it is crossed by the main easterly track (the 1873 journey). At this point Sven Hedin's map (see above) describes it thus: Main branch 214 metres, breadth of the river-bed (of course, at summer high water) about 1600 metres. But as the stream was easily fordable on horseback, and its breadth was that of Prjevalski's smaller figure, it follows that our travellers reached the river at a time when the summer high water (June to July) was already over, while in any case its great breadth did not permit of any great depth.

Equally strong reasons for the westerly track it would be impossible to adduce from the scanty extant records. The very rough passes over the Burkhanbudda, Shuga, and Bayan-Khara-ula ranges, leading to where the Murussu was certainly forded (see above), could just as well have been surmounted by our travellers as they were later by Huo and Gabet and Prjevalski. Beyond the Murussu, where, owing to the severe climate, the caravans begin to break up into small scattered groups, the wayfarer traverses the broad plateau about midway between the river and the "old" route, and thus gains the Tanla range, and beyond it the converging point (Nap-chu) of all the roads leading south.

The Relazione brings the travellers from the Toktokai district through Tangut to the thickly peopled province of Retink. The term "Tangut" is usually restricted to the Kuku-nor region; that is, the north-east corner of Tibet. Hence Markham supposes that in this instance it has been extended to the tableland north of Lhasa. Kircher even applies the name to the whole of east Tibet, Barantola included. Perhaps it might be equally correct simply to reverse the sequence of the two names Toktokai and Tangut.

In Lhasa.—For the capital of Tibet, Grueber uses both the native name Lhasa and the Tatar (Mongol) Barantola. As this was the terminus of the caravan with which they had hitherto travelled, they had now to look round for another destined for India. It is not quite clear how long this took them, as Grueber speaks only of a month ("in hac civitate sumus morati uno mense," Letter II.), while Kircher and Markham give them two months. Perhaps the *one* and the *two* are to be taken as round numbers.

Grueber utilized the delay to fix the latitude of Lhasa, and take sketches of the natives, the temples, and the "Burg Bietala" (Kircher, 74), residence of the Dalai Lama [Pota-la].

From Lhasa to Agra.—Four days out from Lhasa our travellers reached the very high "Langur" range, which Kircher wrongly connects with the Paropamisus of the ancients, and with Marco Polo's Bolar. Crossing this terrible range, where they could hardly breathe from the rarefied atmosphere, and were in constant danger of being poisoned by the effluvia of certain plants, they still took nearly a month to reach Cut(h)i, the first city in "Necbal" (Nepal). In Stieler's old atlas the name "Langur" certainly occurs, only the range is placed too far from

Lhasa to be reached in four days. The pundit of 1867 tells us (*Petermanns Mitt.*, 1875, 150) that the people of Nepal call all snowy peaks Langur, and it is evident from all the circumstances that here Langur simply means the Himalayas. They therefore followed the great highway, which leads from Katmandu to Shigatse, on the upper Brahmaputra (Sanpo), and has often been described. From Kuti they went by one of the most difficult roads in the world (Markham) to Nesti in five days, and thence in six days to the double capital of Nepal, Katmandu-Pattan. Here they had a friendly welcome from the king, whom Grueber greatly astonished with the wonders of a little telescope which he gave him.

From Nepal five days (Kircher) took them to Hedonda, a station of the Moranga state, which state they traversed in five days, meeting no towns, but only straw huts and a royal custom-house. From Hedonda Kircher brings them in eight days to Mutgari (Markham's Motihari), the first city of the Moghul, and thence in ten days to Battana (Patna), on the Ganges, crossing the river at Minapor (Markham's Dinapur). Thence eight days brought them to Benares, eleven to Ca(ta)mpur, and seven to Agra, where de Dorville died (see above). This place was reached about the middle of March, 1662, and as the start was made on April 13, 1661 (see above), the whole journey between Pekin and Agra lasted just about eleven months, as stated by Grueber in Letter II.

Astronomic Observations.—Of special interest to geographers, are the somewhat numerous determinations of latitude which were made by Grueber *en route*. Although pretty accurate, it will be seen, from the comparative figures given below, that all his determinations, owing perhaps to defective instruments, are too low by from 24' to 53', or say, roughly, by a mean of half a degree.

Place.	Latitude (Grueber).	Later determinations.
Sining	36° 10'	{ 36° 39' 20" (Jesuits, 1708-9?). 36° 33' 32" (St. Martin; Easton, 1880). 36° 37' 15" (Potanin, 1884-6).
Lhasa	29° 6'	29° 39' 17" (Pundit; St. Martin).
Katmandu	27° 5'	{ 27° 41' 28" (Pundit). 27° 36" (St. Martin).
Hedonda	26° 36'	27° 26" (Pundit).
Patna	24° 44'	{ 25° 35' (Indian Survey). 25° 37' 15" (St. Martin).
Benares	24° 50'	{ 25° 17'. 25° 18' 33" (Observatory).

Here follow the latitude and longitude (E. of Rome), partly calculated by P. Henricus Busaeus from Letter III. before Grueber's own observations.

Place.	Latitude.	Long. E. of Rome.	Long. E. of Paris (St. Martin).
Agra	26° 43'	—	75° 41' 29"
Delhi	28° 39'	4 ^h 16 ^m 16" = 64° 4'	74° 52' 8"
Surat	21° 10'	Lost.	—

According to Grueber-Busaeus, the longitude east of Greenwich would be for Agra 76° 34', instead of 78° 2' (St. Martin); for Delhi, 76° 54', instead of 77° 12' (St. Martin). All these data, published but not utilized by Kircher, were studied by later European cartographers, amongst others, G. de l'Isle and Nolin for their maps of Asia (Paris, 1700 and 1704).

On other materials supplied by Grueber, Astley wrote about 1745, "With regard to the Chinese and Tartars, Grueber has explained some things more fully than other authors have done, as well as related others in a different manner." His ethnological descriptions and sketches of Tartars (Mongols) and Tibetans agree fairly well with those of K. Futterer and other recent observers. His actual wanderings may be roughly estimated at a total length of some 25,000 miles, or about the circumference of the globe.

VAN DER GRINTEN'S PROJECTION.

By E. A. REEVES.

THERE can be no doubt that for certain purposes it is an advantage to represent the whole surface of the Earth on one plane instead of by two hemispheres. The geographical distribution of population, oceanic circulation, isothermal and isobaric lines, and other natural phenomena, can, as a rule, be much better shown on some such projection; and certainly steamer tracks, telegraph cables, etc., can be followed far more readily when laid down upon a map of the whole Earth than when shown on a projection that necessitates the breaking up of the lines into sections. The drawback to all such projections, however, is the necessary great distortion, either in the area or configuration of the land, in high latitudes. The two projections of this kind which are most familiar, and which can be seen in many atlases, are the well-known Mercator's projection, and the Elliptical Equivalent projection invented by Prof. C. B. Mollweide in 1805. Whilst the former is admirably adapted for marine charts, its enormous exaggeration of the land areas in high latitudes renders it unsuited for most other purposes. In this the angles of intersection between the parallels and meridians, and the general configuration of the land, are preserved at the expense of greatly exaggerated areas and distances as the equator is left. To obviate these defects Prof. Mollweide drew his elliptical projection; but in preserving the correct relation between the areas he was compelled to sacrifice configuration and angular measurement, as will be seen by a glance at Fig. 4.

A projection has recently been constructed and patented by Mr. Alphons J. van der Grinten, of Chicago, of which the object is to strike a mean between the projections of Mercator and Mollweide, and a full description of this is given in *Petermanns Geographische Mittheilungen* for July last. Figs. 1 and 2 give a general idea of this projection and its construction. The parallels of latitude and meridians are contained in a circle, or marginal meridian, the area of which is equal to the surface of a globe of half the diameter. The straight line representing the equator, instead of being divided into 180°, as in ordinary circular projections, is divided into 360°, so as to include the whole equatorial circumference of the Earth; thus, instead of there being 90° on either side of the central meridian, there are 180°. In order to obtain the average general distribution of errors of area and angle to the best advantage, the parallels of latitude increase rapidly soon after leaving the equator, and the points where each of these intersects the central meridian and that forming the circumference of the map or plane of projection is obtained by the formulæ—

$$d = \frac{\sqrt{1+c} - \sqrt{1-c}}{\sqrt{1+c} + \sqrt{1-c}}; \quad y = \frac{c}{2-c}$$

where d represents the distance of any parallel from the equator on the central