AGRICULTURAL INVENTIONS.

Mr. Henry Bell, of McGregor, Iowa, has invented an improved centrifugal churn, which he claims is simpler in construction and of superior efficiency to others now in use.

An improvement in cotton picking machines has been patented by Mr. Frederick F. Trenks, of Round Top, Tex. This improvement relates to machines for picking cotton from the plants by means of a picking cylinder provided with curved fingers and flanges extending beyond the picker fingers.

An improvement in cultivators has been patented by Mr. Peter Gerges, of Skippack, Pa. The object of this invention is to furnish an improved cultivator which shall be simple, convenient, and effective. It consists in a single beam combined with standards and auxiliary blocks and bolts.

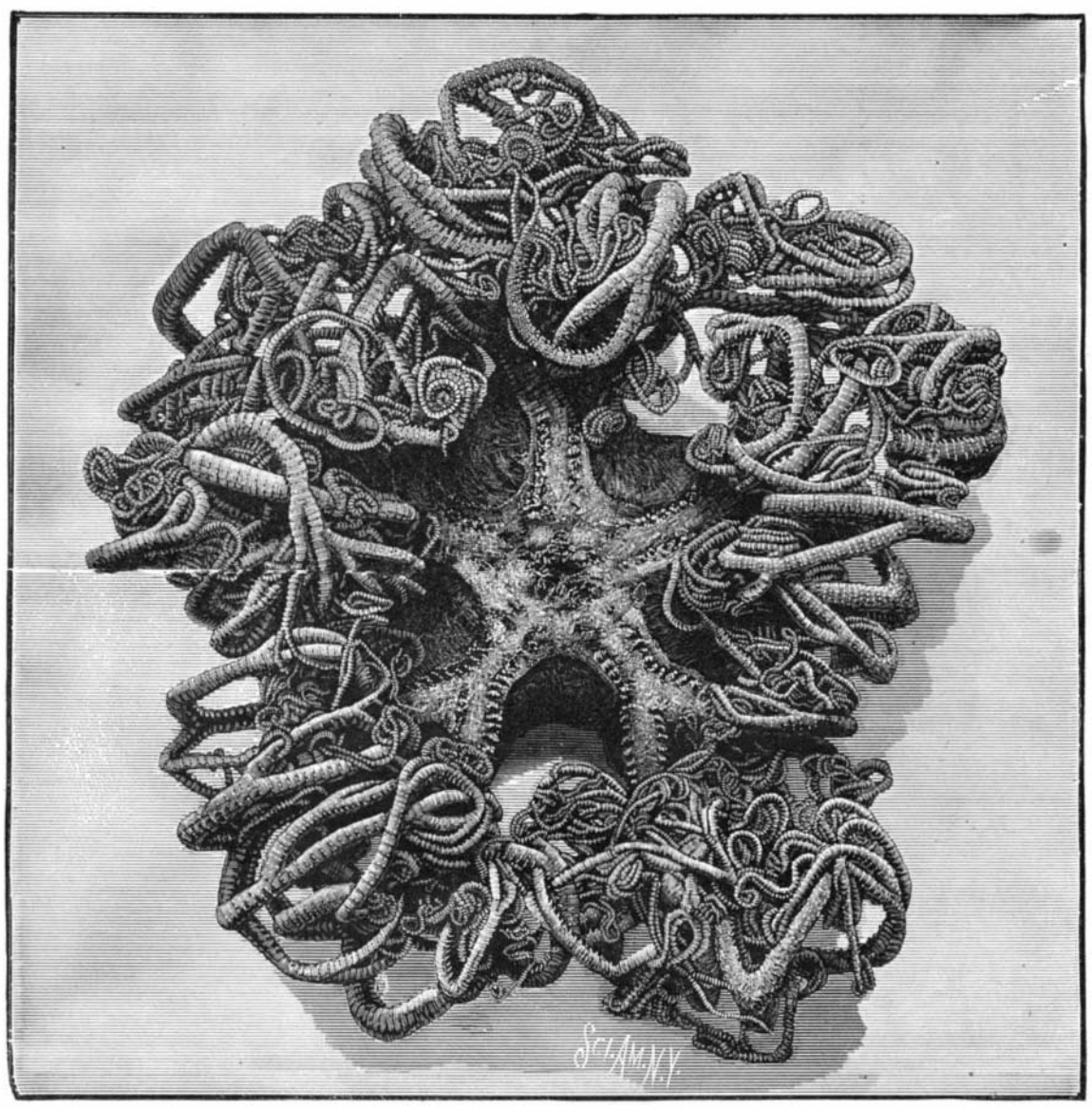
Mr. Marion Smail, of Crawfordsville, Ind., has patented an improvement in combined grader and stalk cutter which consists in combining a drum and loose semi-cylinder with mechanism for operating them.

THE BASKET FISH.

BY H. C. HOVEY.

This elegant ophiuran (or serpent star) has a measure of historic as well as scientific interest. Hon. John Winthrop, who deserves to be called the pioneer of American naturalists, laid aside for a while his cares as Governor of Connecticut, saying, "We shall omit other particulars here, that we may reflect a little upon this elaborate piece of nature." His account of "A Very Curiously Contrived Fish" was published, in 1670, in the "Philosophical Transactions of the Royal Society" (vol. iv. and vol. vi.); and though not up to the present standard of exactness, it is quite accurate as well as graphic, and is remarkable as being the first purely scientific paper from New England. With excusable hesitation, and giving his reasons for doing so, he called the new and nameless fish "*Pisces-echino · stellaris · visciformis*," which has since yielded to the shorter title of *Astrophyton*. He considerately suggested also the English name of basket fish, on account of its resemblance to wicker work; and this is still the name by which it is known among the fishermen from Nantucket to Labrador.

For full details as to the geographical distribution, anatomical structure, and special marks of the entire family of *Astrophytidæ*, the reader is referred to Lyman's "Catalogue of the Museum of Comparative Zoology," at Harvard College, and other scientific works. The species peculiar to our coast is named for the celebrated Agassiz, and described by his son in "Seaside Studies." It is perhaps the least useful and most ornamental creature caught in the Northern Atlantic; and specimens, dried or in alcohol, adorn many cabinets.



THE BASKET FISH.

The body of *Astrophyton Agassizii* is a pentagonal disk, surrounded by arms. The disk, as measured by me in a single specimen, has a diameter of two and three quarters inches; and one of the arms is, in its entire length, nine inches, but as it lies coiled up, like a basket, it is about eight inches across the whole. The size varies with age, but the above is about the average, many being less than half as large, and others twice as great. The upper side of the disk has ten radial ribs bearing short, blunt spines. The mouth is on the under side, and central. It is set with spiniform bristles hiding twenty-four thorn-like teeth. From around the star-shaped mouth branch five stout arms, each of which is divided at the edge of the disk. The animal is wholly covered with an epidermis, granulated above, but smooth beneath, except that it seems to have a double line of stitches under each arm. The general color is light buff; but the inter-brachial spaces in the living animal vary from dark purple to bright pink.

The constant division of each arm at regular intervals into two smaller ones is a most remarkable peculiarity of the *Astrophyton*. Each of the five main branches is divided into two, making ten in all; each of the ten is divided, making twenty—and so indefinitely down to the least visible filament. Winthrop counted 81,920 of these "small sprouts, twigges, or threds."

The statement seems incredible. But take a single branch and count its bifurcations. There are fourteen. A simple arithmetical process shows that there are then 40,960 arms. Had there been one more fork, that number would have thus been doubled to 81,920, as Winthrop has said. No doubt the number is doubled again in larger specimens. One can readily see that it is not easy to represent pictorially such a living labyrinth; and the difficulty is increased by the fact that, on capture or disturbance, the creature instantly folds its more than Briarean arms closely about its body, shrinking from the touch like a sensitive plant, and assuming the basket shape from which it gets its familiar name. The attempt to untwist these coils generally ends in breaking the delicate but tenacious threads.

Last summer I had a rare opportunity for examining living *Astrophytons* while on board the steamer Speedwell off Cape Cod. Thousands of rare and curious marine specimens were obtained by steam dredging for the U. S. Fish Commission, under the superintendence of Prof. S. F. Baird, and the special direction of Prof. A. E. Verrill. Sometimes only a few basket fish would come up clinging to corals and sponges. Again, a few more would be scattered through a netful of flounders, skates, and fishing frogs. But after one memorable cast of the great trawl (17 feet wide and 50 long), there were hauled in an immense number. The water was 200 feet deep, and long before the beam of the trawl emerged, the golden gleaming of the *Astrophytons* was visible through the green waves. The weight was so great that a special lifting apparatus had to be put beneath to keep the net from breaking. As the huge mass lay writhing on deck, the sailors and others eagerly picked out the specimens most easily disengaged from the net and from one another. After about one thousand of all sizes and varieties had been secured, we grew weary of the work, and the remainder were torn off in clusters and mats and thrown overboard, and the fragments scooped up with shovels. The entire number was estimated at fully 5,000. The trawl had been dragged over one of their favorite places of resort; or they may have the custom, ascribed to star fish, of rolling themselves together in a ball and floating with the ocean currents, and in that case we must have captured an entire colony.

The basket fish is a voracious feeder, and its peculiar construction aids it in taking its prey. The microscope shows each arm and spine to terminate in a minute but sharp hook. According to Agassiz, the animal, in moving, lifts itself on the extreme end of its long arms, standing as it were on tiptoe, so that "the ramifications form a kind of trellis work all around it, reaching to the ground, while the disk forms the roof." This latticed bower is but a cruel trap for entangling heedless little fishes and shrimps, whose escape from those deadly coils is as hopeless as the efforts of a fly to break loose from a spider's web.

Professor Huxley on Snakes.

The opening lecture at the London Institution for the season was lately delivered by Professor Huxley, F.R.S., to a very crowded audience, his subject being "Snakes," than which, he said, there were, in the popular apprehension, few animals more symbolical of degradation and horror. Quoting the primeval curse in Genesis, he remarked that no creatures seemed more easily destroyed by man, and few less able to defend themselves. Few wounds would be less harmful than a snake's bite were it nothing more than the sudden closing of the teeth. Yet there were not many animals gifted with so many faculties. It can stand up erect, climb as well as any ape, swim like a fish, dart forward, and do all but fly in seizing its prey. The destructiveness of snakes to man was illustrated by the fact that 20,000 human lives are yearly lost in India by their poison, and it might safely be said that they are a more deadly enemy to our race than any other beasts of the field. Professor Huxley spoke first of the three classes indigenous to our own climate—the ringed snake, the coronella, and the viper. Of these the viper alone was venomous, which the differences between its structure and that of the harmless British snakes helped to explain. It might be that the reason there were no snakes in Ireland was the multiplicity of its other plagues. Everybody must be struck with the beauty of the harmless snakes, which formed the overwhelming majority—especially the grace with which they wreathed their bodies into circles, and their fine eyes. The venomous snakes were not so beautiful. None admired our native viper, with its yellowish scales. To adults its bite was far seldomer serious than to the young. Passing to snakes in general, of which there were many hundreds of distinct species, the lecturer illustrated in great detail the adaptation of their organization to its manifold work. Very graphic was his description of the manner in which some of the more destructive snakes dart suddenly on their prey, twisting themselves round its body, crushing it into a shapeless and writhing mass, and at last swallowing it whole. He pointed out some very curious arrangements in the anatomical mechanism and jaw bones illustrative of the statement that the snake cannot properly be said to swallow his prey; he holds on to it rather, gradually working it down its throat in a most leisurely manner, but never letting it go. He would take a sleep for six weeks before giving up his task, and if the morsel were really too big would sometimes die in the effort to get it down. Of course, the snake required a very fully-developed and effective apparatus of salivary glands for this purpose. The poison bag of the venomous snakes was nothing but a modification of the salivary glands of the harmless species, the structure of both kinds being in almost all respects [illegible] parallel throughout but almost identical As another instance of the close relationship, it was shown that the sharp channel needle which conveys the poison of the cobra and its congeners is nothing but the development of the tooth which these murderous reptiles possess in common with innocuous snakes. The fact that the salivary gland was the poison laboratory of the deadly snakes, as well as the known properties of the saliva of dogs or other living creatures affected with rabies, appeared to Professor Huxley to point out the direction in which lay the solution of the difficult problem of the cause of snake poisoning, and of a possible antidote against it. At present there was no man living who could heal the bite of the cobra, except by cauterization in very fresh cases.

Jet.

The mineral itself is nothing more nor less than a species of pitch coal, found in detached masses, grained like wood, splitting horizontally, light, and moderately hard. It is often confounded with "cannel" coal, but it is quite distinct. Cannel coal is much harder than jet, has no grain, and splits in any direction. Jet is not easily fused, and requires a moderately strong heat, burning with a fine, greenish-white flame, and emitting a bituminous smell. The particular value of jet is, of course, its susceptibility for taking on a fine polish. Jet abounds more or less all over the world.

In England it is found in greatest quantities in the neighborhood of Whitby, in Yorkshire. There it is mixed with bitumenized wood and coniferous trees in the upper lias or alum shale of the district. In Prussia it occurs in association with amber, and is named by the amber diggers "black amber," a phrase which seems to have traveled to Italy, for the mineral is there sometimes called "ambra nera." This term is more applicable from the fact that jet, like amber, becomes electrical by friction.

There is a belief that amber and jet come from one source: that amber is a fossil gum, while jet is the trunks and the branches of the trees more completely bitumenized and freer from earthy impurities than cannel and other coal. Indeed M. Magellan goes so far as to say that jet is a pure amber, differing only in color from the undisputed variety. In France large quantities are found in the department of the Aude, where a large number of artisans find steady employment in fashioning it into rosaries, religious beads, and ornamental trinkets when fashion demands them. In Spain jet of a very high quality is found at Villaviciosa, in the province of Asturias, and is manufactured principally at Oviedo.

But during the present century jet became a popular ornament, and now probably in not a few minds Whitby and jet are inseparably associated. The article acquired considerable value, and some twenty years ago jet ear-rings ranged in value from 5*s.* to 30*s.* a pair. Then a lucrative trade was carried on at Whitby, jet miners scooped out pits in the pretty Cleveland hills, and a large number of men and young women in Whitby found employment in carving the precious coal into articles of feminine ornament. But the success of the English jet trade brought competition into the field, and with it imitation, which latter first demolished the genuine jet trade and then committed suicide. Cheap and inferior jet was imported from France and Spain, and what was wanting in value with regard especially to the former of these was amply compensated for by the superior taste displayed by the French artists in designing the ornaments. Then colored glass invaded the jet market, but the greatest blow of all was the invention of vulcanite. Vulcanite is a simple compound, its only components being India rubber and sulphur, combined by the pressure of steam. This substances has many advantages over real jet. It is equally black, more tenacious, and consequently more suitable for watch guards. It is also more easily worked, being manipulated while hot, and is not more than one-tenth the price of jet.

Vulcanite became the rage for a time, and jet fell into disuse. But the manufacturers of vulcanite, not satisfied with their victory over genuine jet, fell into evil ways, and succumbed to the great temptation to adulterate the genuine vulcanite. The addition of *litharge* and whitening cheapened the vulcanite considerably, and for a time did not interfere with its appearance; but the pernicious effects of the alloy soon tells, and the "jetty black" of vulcanite turns to a faded green. The vulcanite rage passed over, and fashion in its reaction from the somber ornaments flew to the opposite extreme, and set up a "silver mania." There are now signs that this is on the wane, and the leaning for oxide of gold, by which the rapid transition from jet to silver among the masses was slightly interrupted, does not seem likely to come into favor again. In this state of matters, says the *Colliery Guardian*, comes the announcement from Whitby that there are signs of a revival in the jet trade.

The indications of a resuscitation of the industry are certainly tangible, but while not desiring to throw a wet blanket on industrial hopes of any description, we would venture to question whether there are any real grounds for supposing that the manufacture of jet will ever experience anything like a real revival. It may be true that the stocks of jet ornaments at Whitby are being exhausted, but what does that prove? The fact is that jet has been for some years so low in value as to be hardly "worth keeping," and probably hardly worth carrying away. Ear-rings which in the halcyon days of the jet trade would have fetched 30*s.* a pair, retail price, could, during recent years, have been had for 5*s.*, and what were 5*s.* ear-rings formerly are now worth about 2½*d.* The case is the same with vulcanite, and an ornament of this composition which might have cost 2*s.* ten years ago, could now be bought for 1*d.* or 1½*d.*, and should fashion in its caprice lend a favorable eye to "black jewelry," and jet consequently acquire an increased value, that moment would the market be flooded with vulcanite. How cheap soever jet ornaments may be made, vulcanite will undersell them, and as vulcanite looks equally well, is more durable because less brittle, and is in many respects superior, any resuscitation must be ephemeral, and the sparkling coal from Whitby must succumb before a bare preparation—a fact more galling than that which befell "The ielt or marble farre from Ireland brought," which yielded in Spenser's imagination to the "Stone more of value, and more smooth and fine."

NATURAL HISTORY NOTES.

Origin of the Name "Puss."—Says the editor of the *Zoologist*, the cat was worshiped in Egypt as a symbol of the moon, not only because more active at night, but from the priests conceiving that the contraction and dilatation of the eye afforded an emblem of the increase and decrease of the moon's ever-changing orb. In the British Museum may be seen several figures of the cat-headed goddess Pasht, under which name the moon was worshiped by the Egyptians—Pasht signifying the face of the moon. "Pasht" is compounded of the consonants P, SH, T. T is the coptic feminine article, which, being omitted, the same is reduced to P, SH, but the aspirate SH should be the tenuis S, and then the word would be PS, as in Hebrew, and which may be pronounced "pas" or "pus" (puss). It thus appears that our familiar name for the cat can boast of a very high antiquity.

Grass Fatal to Sheep.—One remarkable fact connected with the botany of Queenstown is, that a grass, which grows locally abundant in the more northern portions of the colony, *ristida hygrometrica*, is fatal to sheep by reason of its long, sharp, tripartite awns getting entangled in the wool and ultimately piercing the skin and penetrating to the viscera of the thorax and abdomen, causing death after prolonged wasting and suffering; the heart, liver, kidneys, etc., are sometimes, on dissection, found pierced by these mischievous awns in all directions.

The Influence of Soil on Plants.—Sufficient attention, perhaps, has not been paid to the study of the influence of soil in producing variation in plants, and changes and modifications of their constituents. A writer in the *Pharmaceutical Journal* has recently called attention to the fact that it is rare to find the *Viola odorata* with blue flowers on a calcareous soil in England, the prevailing color being white. One of the genus of violets has lately been examined by Dr. König, who finds as much as 21 per cent of zinc oxide in the ash of the plant. This violet is so distinct in appearance that it has been considered a good species by some botanists, and called *Viola calaminaria*. But by most authorities it is regarded as a variety of *V. tricolor*, its characteristics being due to the soil on which it grows. It appears to be restricted to soil containing zinc, and thus serves to indicate the presence of the metal in the soil, where it might not otherwise have been suspected. The extent to which medicinal preparations may be affected by the soil upon which the plants they are prepared from have grown, is illustrated by an experience of M. Gérardin, pharmacien, in the Marne department. Having prepared some extract of belladonna from a defecated juice, he found it after some weeks full of grannlations. These proved to consist of a mixture of silicate and chloride of potassium equal in weight to 6·8 per cent of the original extract. It was then remembered that the belladonna plants used had been collected from a spot which had long been frequented by charcoal burners for their operations, and the remainder of the explanation was to be found in the decided fondness of solanaceous plants for silica and potash.

Changing the Color of Feathers in Live Birds.—It is stated in Kidder and Fletcher's "Brazil" that the Indians have a curious art by which they change the color of the plumage of many birds. They pluck out a certain number of feathers, and in the various vacancies thus occasioned infuse the milky secretion made from the skin of a small frog. When the feathers grow again they are of a brilliant yellow or orange color, without any mixture of green or blue, as in the natural state of the bird; and, it is said, the yellow feather will ever after be reproduced without a new infusion of the milky secretion.

Leaf Structure.—Long ago Nehemiah Grew published some very accurate drawings of the structure of leaves and leaf stalks—so far as the disposition of the fibrous tissue is concerned. Quite recently M. Casimir De Candolle has investigated the same subject with special reference to the distinction and resemblances to be drawn between allied species of the same family. It is found that different species of the same genus sometimes accord, but sometimes differ notably in this part of their anatomy. For this reason the classificatory importance of these differences is low, although they may often be turned to good account in the discrimination of related species. The essential fibro-vascular system of the petiole, as displayed on a cross section, forms either a closed ring or an arc open superiorly between the outer or cortical, and the inner or medullary tissue. In the first case it is said to be closed or complete, in the second open or incomplete. Very commonly this is the only vascular system of the petiole, ribs, or veins. Not rarely there are additional or accessory bundles, sometimes external to the essential system, or *intracortical;* sometimes within the arc or ring, or *intramedullary;* occasionally there are both intracortical and intramedullary bundles. Generally plants of the same natural order will agree, at least approximately, in having the closed or open system, and in having or wanting the accessory bundles without or within. But while *Acer pseudo platanus* has a well developed intramedullary cord, *. platanoides* has none, and in general the maples are divided in this respect quite independent of other characters; and the difference is similar and equally marked between the species of *Æsculus*. The oaks, which have been made a special study in this regard, appear to be somewhat equally divided between species provided with and those destitute of intramedullary bundles; but related species generally belong to the same category, although not always. For in one case two species, of doubtful distinction until now, are confirmed by the discovery of an anatomical difference of this sort. All the birches examined want the intracortical bundles, and the principal system forms an open arc, and one or two alders nearly agree with them; while the others have a closed ring and are furnished with intracortical bundles.

Barometric Plants.—Linnæus, in his "Flora Lapponica," writing on the white clover *Trifolium repens*, states that it is a common practice to predict a coming storm by an inspection of this plant, for when the air is hot then the leaves hang down, whereas when there is moisture in the atmosphere the leaves are erect. This observation, he remarks, holds good not only for the clover, but also for almost all plants which have declinate stamens. All the flowers, too, he adds, generally converge when a shower is impending, as though they knew that the water would interfere with the fertilization of the plant, for when the fertilization has been effected no such convergency is exhibited. He instances *Mimosa, Cassia, Bauhinia*, and their allies, as plants whose leaves converge every evening, even though there be no diminution of temperature, and concludes by asking the still unanswered question, What is the cause of this sensitiveness, and what change is there in the night air beyond the absence of light and heat? Dr. Hooker states that the leaflets of *Oxalis* are pendulous at night, and often sensitive to light. Of *Anagallis arvensis* he remarks that the corolla opens in clear weather, and a number of plants besides those specified exhibit the same phenomenon, and doubtless obey the same law. What is this law?

Some Facts about our Territories.

The annual report of the Secretary of the Interior contains a large amount of information with regard to the present condition and future prospects of our Territories, furnished by their respective Governors. The more important facts are as follows:

UTAH.

The snows which fall in the mountains and remain there during the summer provide the main supply of water necessary for irrigation. During last winter but little snow fell, hence the short supply and the deficiency in the crops. Some of the largest streams in the Territory have gone dry, something never before known to the oldest settlers. Even the Great Salt Lake has fallen four or five feet. Stock has suffered severely on the mountain ranges.

Attention is called to the defects in the present mining laws, and suggestions are made as to the amendments necessary. The Governor holds that "a man's patent to his mine should be a perfect title to the property covered by his patent, and parties purchasing patented mines should be required to trace titles no further than to the patentees." He also favors the granting of a larger surface area, and the confinement of rights within the lines granted. In other words, a mining claim should be as definite, so far as boundaries go, as that of a city lot, and the right to work should be confined within the perpendicular lines of its side and end. Following the dip of mineral veins on the ground of other parties is, in his opinion, the fruitful source of litigation. The mining interests of Utah are reported as in a most excellent condition; the introduction of new methods of reducing ore causing larger profits to be realized than were possible in former years.

From the year 1870 to 1878, inclusive, the Utah board of trade reports, as taken from the books of the Utah Central Railroad, the shipment from Salt Lake City of 76,912 tons of lead ore, 109,276 tons of argentiferous lead bullion, and 8,197 tons of lead, worth in the aggregate about $40,000,000. The value of the ores taken out during the past three years was $18,558,805.48; of this $5,379,446 was lead, the remainder being the precious metals.

During the past year 150 miles of additional railroad have been built.

WASHINGTON TERRITORY.

The Governor of Washington Territory reports satisfactory advancement in the development of the agricultural, manufacturing, mining, and commercial resources of the Territory. Its isolated position and the misconception existing in relation to its climate and productions have tended to prevent its rapid growth.

Situated between the 46° and 49° north latitude, its climate is generally believed to be cold, and yet the results of careful observation show that the climate of Western Washington is mild, during the winter months the temperature seldom falling below the freezing point. A tabular statement is given, showing the character of the climate throughout the year, based on accurate meteorological observations taken at Port Blakeley, on Puget Sound, in latitude 47° 36′. It would appear from this statement that the lowest temperature during a period of twenty-six months was 25° above zero. The highest in 1877 was 88°; in 1878, 94°; and in 1879, 86°.

The average rainfall is about the same as in the Eastern and Western States. The mildness of the climate is due to the presence of the thermal current, having its origin at the equator, near the 130° east longitude, Greenwich, and which flows northwardly to the Aleutian Islands, where it separates, one branch flowing eastwardly, along the peninsula of Alaska, and then southwardly, along the coast of British Columbia, Washington Territory, and Oregon. The prevailing winds during the winter are from the southwest, and those of the summer from the northwest.

The temperature of Eastern Washington as compared with the western division is slightly higher during the summer and lower during the winter. The average annual temperature is reported as follows: spring, 52°; summer, 73°; autumn, 53°; winter, 34°.

All the cereals, fruits, and vegetables grown within the temperate zone can be raised in Washington Territory. Eastern Washington is the great wheat field of the Territory, with a capacity for upwards of 100,000,000 of bushels. The average yield is 25 bushels to the acre.

The exportation of wheat during the present year will be upwards of 60,000 tons. Transportation facilities are inadequate to the demand, and will so continue until the obstructions are removed at the Dalles, Cascades, and other points on the Columbia River.