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- II. **TECHNOLOGY.**—The Sizing of Cotton Goods; a paper read before the Society of Arts, by W. THOMPSON, F.R.S. A very full and clear description, embracing: An account of the process of weaving, explaining the object and utility of size. A table of sizing mixtures in which are enumerated all the substances used, (1) for giving adhesive properties to the size, (2) to give weight and body to the yarn, (3) for softening the size or yarn, and (4) for preserving the size from mildew and decomposition. Tests for these substances and directions for mixing, so as to obtain the results required. Proportions of sizing. Use of flour in size. Weighting materials, China clay and its substitutes. "Softening" and oils for softening. East winds. Glyceiric, grape sugar, mildew preventives, and tape sizing. "Slashing," packing, mildew, damaged goods, etc.—Notes on Garment Dyeing. Giving preparation of garments with cotton warps, green on garments with cotton warps, brown on the same, etc.
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- VI. **MISCELLANEOUS.**—The New German Patent Law: being the Full Text of the New Law for Patents, passed July 1, 1877, covering all the States of the German Empire.

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CARRYING PEACE INTO AFRICA.

To carry war into Africa has been a proverb ever since Rome vowed the destruction of Carthage. But the Carthaginian invasion was a modern episode in Africa's experiences of that nature. On one of the earlier monuments of Egypt there is figured a slave-hunter's raid upon an Ethiopian village, the horrid details of which are said by travelers to be an accurate picture of a slave raid of to-day. The same murderous work has been going on incessantly for at least 4,000 years: how much longer there is no telling. For all these ages the African borders have known war and war only, and of the most destructive and barbarizing nature.

Recently, under the influence of Sir Samuel Baker, Colonel Gordon, and the civilized world in general, the Khedive of Egypt has carried war into the interior in the interests of peace: a conquest in a measure justified by the suppression of inter-tribal war for the filling of slave pens, and the abolition of the slave trade down the Nile. A similar reform has been effected on the east coast by the pressure of English power on the Sultan of Zanzibar. And the immediate effect of these two movements has been to prevent the butchery or enslavement of not less than half a million negroes annually.

A still more promising invasion of Africa has just been decided upon in the International Geographical Conference in Brussels: an invasion wholly in the interests of peace and civilization. At the meeting, a year ago, it was declared advisable to establish, by international effort, a line of permanent commercial stations from Bagomoyo, on the coast of Zanzibar, to St. Paul de Loanda, on the opposite Atlantic coast; the first stations to be at Ujiji, where Stanley found Livingstone, on the eastern shore of lake Tanganyika; at Nyangwe, Livingstone's furthest point northward on the Luabala; and at some point further west on the route of Cameron, to be fixed in the dominions of Muata Yamvo, one of the most powerful chiefs of Central Africa. At the second conference, which ended June 24, arrangements were made for sending out the first expedition toward Tanganyika.

The object of the proposed stations is the development of civilization by commerce, not by religious propaganda. Primarily they will serve as bases of operation for explorers of the interior, a sort of *entrepôts*, where the explorer may supply himself with provisions, instruments, and goods, and thus save the cost and embarrassment of an army of porters from the coast. They will also serve as places of refuge for explorers in times of sickness and other reverses, which have hitherto so terribly hampered explorers. The heads of these pioneer establishments are to be men of scientific training and proved executive ability; and each will be aided by a physician-naturalist and a few skilled artisans. The points thus far chosen are on a line regularly traveled by the caravans of Arab traders, carrying coffee, tea, sugar, arms, and woven goods to permanent Arab residences and trading stations in the interior. An agent of the London Missionary Society has already begun the survey of a route for ox teams as far as lake Tanganyika; and Cameron has expressed the opinion that a light narrow-gauge railway could be constructed from the coast to the lake at a cost not exceeding four thousand dollars a mile. The traffic along such a road, he thinks, would soon pay interest on the outlay.

The unexplored region thus to be opened up to civilization and commerce (other than in human beings) is larger than the United States east of the Mississippi. Around it is a still larger region of partially explored country of unequalled fertility, abounding in great lakes and navigable rivers, and for the most part so high above the sea that the products of the tropics mingle with those of the temperate zone. The cereals, durah, maize, rice, sugar cane, starch-yielding roots and tubers, cotton, coffee, tobacco, spices, gums and caoutchouc, dye-stuffs and medicinal plants, the banana, fig, date, orange, and the vine are among the known products of this region; and all are capable of becoming important staples of foreign commerce. The country is not less rich in coal, iron, copper, gold, and other valuable minerals. The climate, though moist from abundant rain, is less debilitating than India or Brazil; and everywhere, away from the miasmatic coast regions and the marshes of the lower river courses, European explorers have found small cause for complaining of excessive heat or unhealthiness. On the elevated plateaus which cover so large a part of Central Africa, the climate is like that of the sanitariums of India; while among the mountains the finest climates of the world are fairly rivalled. Stanley found in the mountainous region between the great lakes and within a degree of the equator every climatic condition and every element of landscape beauty that could attract and delight a white colony. It was a perfect alpine country, with mountains rising from twelve to fifteen thousand feet, yet free from alpine cold and snow. Countless torrents from the hills watered ever-verdant valleys as beautiful as those of Tyrol, lying under a brilliant equatorial sun, yet with a climate as cool and equable as any European might desire. Further south, among the mountains about Lake Nyassa, the same features are presented on a grander scale: a country aptly described as a second Switzerland of gigantic proportions.

There can be no question of the ability of Europeans to sustain themselves in the greater part of the interior—certainly on all the higher plateaus—nor of the possibility of building up in Central Africa a great civilized empire. Nature offers every facility, and the native population seem to be well fitted for productive industry. In every respect they are physically and morally superior to the negroes of

the coast, and only need protection and the encouragement of legitimate commerce to weld them into a great nation. Already they stand on the borders of civilization. They are intelligent, industrious, and not unskillful in the manufacture of iron and copper ornaments, utensils, and weapons. The arts of tanning, spinning, weaving, dyeing, mat-making, etc., are widely diffused among them, and many of their products are remarkable for their fineness and strength. They carry on agriculture with considerable success; and, notwithstanding the chronic state of insecurity incident to slave-hunting, their wealth in cattle is very great. As soon as the disturbing and impoverishing influence of the slave traffic is abated, and a market provided for the products of peace, the advancement of the people in civilization is likely to go on with great rapidity. As the source of raw materials which we need, and as a market for the surplus manufactures of Europe and America, the country offers, to say the least, many attractions; and it will not be surprising if, within fifty years, thriving commercial stations will be founded on all its great lakes and rivers, and connected with the outer world by telegraphy, railways, and steamship lines.

ADDRESS OF CLARENCE KING ON CATASTROPHISM.

Mr. Clarence King lately delivered an interesting address before the Sheffield Scientific School of Yale College, New Haven, Conn., under the title of "Catastrophism, or the Evolution of Environment," which promises to evoke considerable discussion. We subjoin an abstract of the principal features of the address, which is quite lengthy. The full text will be found in our SUPPLEMENTS, Nos. 80, 81.

Mr. King refuted the doctrine of slow evolution as taught by Huxley and Darwin, and declared that the surface of the earth and climate had been subject to sudden and catastrophic mutation, which included in its environment all types of life.

He reasoned that marine fossils are found entombed in rocky beds far remote from present seas; and that these beds were once sea bottoms that have been upheaved by convulsions of Nature. The earliest history of mankind is pregnant with catastrophe, and we have historic story and biblical record of its sudden and destructive energy. He called to mind the vast and massive eruptions of the Pliocene basalt as seen upon our own continent.

The great obvious changes in the rocky crust were referred to a few processes; the sub-aerial decay of continents, delivery by streams of land-detritus into the sea, the spreading out of these comminuted materials upon a pelagic floor, and lastly upheaval, by which oceanic beds were lifted up into subsequent land masses. All these processes he declared to have been more rapid in the past than now. Suddenness, world-wide destructiveness, were the characteristics of geological changes. Periods of calm, like the present, are suddenly terminated by brief catastrophic epochs. Successive faunas and floras were created only to be extinguished by general cataclysms.

He believed in recurrent, abrupt accelerations of crust change, so violent as to destroy all life on the globe. He declared the idea to be the survival of a prehistoric terror, and was backed up by breaks in the great palæontological record.

Of the geologic features of our continent, he said that beneath our America lies buried another distinct continent, which he called Archæan America, which was made up of what was originally ocean beds lifted into the air and locally crumpled into vast mountain chains, which were in turn eroded by torrents into mountain peaks. The original coast lines of this continent we may never be able fully to survey, but its great features, the lofty chains of the mountains which made its bones, were very nearly co-extensive with our existing systems, the Appalachians and Cordilleras. The cañon-cutting rivers of the present Western mountains have dug out the peaks and flanks of those underlying, primeval up-lifts and developed an astonishing topography; peaks rising in a single sweep 30,000 feet from their bases, precipices lifting bold, solid fronts 10,000 feet into the air, and profound mountain valleys. The work of erosion, which has been carried on by torrents of the quaternary age, brings to light buried primeval chains loftier than any of the present heights of the globe.

At the close of the Palæozoic age, two enormous masses of what, probably, were then continents began to sink, and as they disappeared the present Atlantic and Pacific oceans appeared, while the sea-floor of a then ocean, emerged, and became the new continent of America. Dividing this new continent was a sea, but catastrophe removed this sea and resulted in the folding up of mountain ranges 20,000 and 40,000 feet in height, thereby essentially changing the whole climate of the continent. Of the land life of the mesozoic age we have abundant remains. The wonderful reptilian and avian fauna of the mesozoic age is now familiar to all. But after the catastrophe, and the change of climate which must necessarily have ensued, this fauna totally perished.

After criticising the opinions of Huxley, Lyell, Hutton, Darwin, and others, he recurred to the effects of sudden terrestrial or cosmical changes, and conceived that the effects of these changes would be, first, extermination; secondly, destruction of the biological equilibrium; and thirdly, rapid morphological change on the part of plastic species. When catastrophic change burst in upon the ages of uniformity, and sounded in the ear of every living thing the words "Change or die!" plasticity became the sole principle of salvation. And plasticity is the key to survival and prosperity. Mr. King remarked in conclusion of his address: "He who brought to bear that mysterious energy we call life upon