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QUEBEC GARRISON CLUB

LECTURES

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1888-9

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1888-9

QUEBEC, 1st JANUARY, 1889.

QUEBEC GARRISON CLUB

ESTABLISHED 11th SEPTEMBER, 1879

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I

LECTURE

Delivered at the Quebec Garrison Club, on the 27th November 1888, by Major Oscar Prévost, Superintendent of the Government Cartridge Factory, Quebec.

SUBJECT :—L'ARTILLERIE ET LES EXPLOSIFS DE NOTRE ÉPOQUE.

MESSIEURS,

Vous m'avez fait l'honneur, par l'entremise des membres du comité de ce club, de m'inviter à donner une conférence sur un sujet militaire et je viens, en réponse à cette invitation vous entretenir ce soir de " l'artillerie et des explosifs de nos jours " ; sujet très vaste sans doute, mais que je m'efforcerai de traiter de la manière la plus complète possible sans abuser de votre bienveillante attention.

Depuis bientôt trente ans, Messieurs, vous le savez, on travaille dans l'artillerie des diverses puissances civilisées, a résoudre un problème de perfectionnement dont les premières données furent posées sur les champs de bataille de Solferino et de Magenta, lorsque les canons rayés de Napoléon III, les premières de ce genre qui aient été mis en usage en campagne, décimèrent à des portées inconnues jusqu'alors les réserves de l'armée Autrichienne.

Quelques années plus tard, les sanglantes défaites de 1870 attestaient encore l'importance de l'artillerie perfectionnée dans les combats.

Cette fois la France s'était laissé devancer par une nation rivale et les pièces de l'artillerie française lourdes et inférieures en portée ainsi qu'en justesse de tir aux canons Prussiens, se voyaient souvent forcées de se retirer d'une lutte qu'elles ne pouvaient soutenir.

Je ne saurais m'occuper de l'emploi de l'artillerie au point de vue tactique en campagne, dans les guerres de siège, dans la défense des forteresses, ou encore dans la marine. Cet aspect du sujet tout intéressant qu'il devrait être, traité même brièvement, m'est interdit par le temps disponible.

Je m'attacherai donc a considérer l'artillerie moderne au point de vue passif, c'est-à-dire, de son matériel et plus particulièrement des bouches à feu.

Deux systèmes ont divisé les opinions des experts dans la construction des pièces d'artillerie depuis qu'on utilise les pièces rayées: Le système du chargement par la bouche et celui du chargement par la culasse.

Les artilleurs francais se sont portés, jusqu'en 1870, en faveur du chargement des pièces par la bouche et les allemands, Herr Krupp en tête, ont adopté le chargement par la culasse.

Les anglais attachés tout d'abord à ce dernier système qu'Armstrong avait utilisé dans les premières pièces rayées qui aient été construites en Angleterre, l'abandonnèrent ensuite pour le chargement par la bouche et reviennent maintenant au système par la culasse que les français avaient, à leur tour, presque exclusivement suivi depuis 18 ans.

L'un et l'autre chargement offre certains avantages et desavantages.

La fermeture dans le système a culasse mobile est un point faible qu'on est parvenu cependant à perfectionner, et l'appareil de fermeture du colonel de Bange, adopté en France d'abord et ensuite en Angleterre, parait être celui qui jusqu'ici ait le mieux rempli les conditions requises.

L'obturateur de Bange consiste en une *tête mobile* convexe en acier, selon la description technique "en forme de tête de champignon," qui s'engage dans un cylindre fileté, à pans interrompus, se vissant dans la culasse.

L'obturateur est garni d'un coussin annulaire composé d'amiante enduite de suif, que recouvre une garniture de feuillard de zinc renforcé d'anneaux mobiles en cuivre qui s'appliquent sur les parois de la pièce et scellent hermétiquement le joint de l'obturateur et de la culasse, au moment de l'explosion de la charge (voir figure).

On conçoit quels avantages peut donner le chargement par la culasse si l'on veut se rappeler qu'aujourd'hui, dans la défense des ports fortifiés et dans la marine, il faut pouvoir perforer, souvent à des distances assez considérables, des blindages de fer et d'acier qui atteignent une épaisseur de 16, 18, 24 et même 30 pouces. Car on en est arrivé à blinder dans la marine, avec des plaques en acier, le fer n'offrant plus assez de résistance dans les limites de poids que peut flotter un navire sans devenir tout a fait impropre à la manœuvre.

Les expériences faites à Gavre, en France, en 1883 avec des plaques en acier, fabriqués pour la marine française, dans les usines des messieurs Schneider, au Creusot, ont démontré qu'une pièce lançant un projectile de fonte trempée d'un poids de 760 livres environ, avec une vitesse de 1450 pieds à la seconde au moment de l'impact, ne pouvait perforer une plaque en acier de 16 pouces d'épaisseur. Je dois remarquer cependant, que si au projectile en fonte trempée, on eut substitué un obus en acier forgé tel qu'on en fabrique maintenant en France en Angleterre et ailleurs, il est très probable pour ne pas dire certain qu'on eut réussi à perforer la plaque dont on s'est servi dans cette expérience.

Quoiqu'il en soit l'industrie n'avait pas dit son dernier mot en cette circonstance, car on fabrique maintenant au Creusot, des blindages en acier d'une épaisseur bien plus considérable, ils atteignent 60 centimètres (environs 24 pouces), une largeur de 3 mètres, (environ 10 pieds), et pèsent 70 tonnes.

La lutte à laquelle nous assistons depuis plusieurs années, entre blindages et canons, n'est donc pas encore terminée tant s'en faut ; à peine a-t-on construit une pièce qui puisse perforer le blindage le plus résistant, qu'on se hâte aussitôt de fabriquer un blindage plus résistant encore et en adoptant les plaques en acier ou doublées d'acier, on a simplement prolongé la lutte.

Mais pour produire des effets disruptifs aussi considérable que ceux qe l'on cherche à obtenir avec les pièces d'artillerie modernes, il faut un déploiement de forces mécaniques en rapport. On a donc dû augmenter le poids des charges de poudre et celui des projectiles, ainsi que

que le calibre et le poids des pièces, pour en arriver à construire des canons de 100 tonnes et au-delà ayant un calibre de plus de 17 pouces lançant un projectile de 2000 livres avec une charge de 478 livres de poudre, produisant une force perforante de 33-570 foot-tons.

Les canons de 100 tonnes construits par Sir W. Armstrong, pour la marine Italienne, ont une longueur de 36 pieds et se chargent par la bouche. Or il est assez difficile, supposant les condition les plus favorables, de charger, même avec des refouloirs hydrauliques, des pièces de cette longueur, portant une charge et un projectile d'un poids aussi considérable.

De graves accidents, attribuables à l'excessive longueur des pièces se chargeant par la bouche, aux difficultés de leur chargement et à l'emploi de refouloirs hydrauliques, les seuls cependant dont on puisse se servir avec les hauts calibres, de graves accidents, dis-je, se sont produits il n'y a pas très longtemps.

Vous vous rappelez sans doute encore, l'explosion désastreuse qu'on eut à déplorer il y a quelques années, à bord du cuirassé anglais le *Thunderer*. Il a fallu reconnaître, après bien des perquisitions, que l'accident était attribuable à l'usage d'un refouloir hydraulique dans une pièce *en tourelle*. Cette pièce ayant raté avec une première charge, en reçut une seconde, les servants de pièce assourdis par la décharge d'une pièce contigue ne s'étaient pas aperçu du raté d'étoupille qui s'était produit, une seconde mise du feu détermina l'explosion de la double charge et la rupture de cette pièce de 80 tonnes, dont les débris tuèrent une vingtaine d'artilleurs qui faisaient le service de la tourelle.

Cet accident n'eut évidemment pu se produire avec le chargement par la culasse, car, en ouvrant la culasse pour y mettre une nouvelle charge, on se fut de suit aperçu que la pièce était encore chargé.

Il est vrai de dire que l'on peut dans d'autres situations se servir d'un refouloir ordinaire pour opérer le chargement, mais ce mode nécessite, avec les grosses pièces, l'emploi d'un grand nombre d'hommes pour refouler des projectiles d'un poids aussi considérable. Les manœuvres du chargement se compliquent alors singulièrement. D'autre

part pour qu'une charge de poudre aussi énorme que celle que l'on emploie puisse se consumer entièrement et produire tout son effet utile dans la pièce, il faut que celle-ci ait une certaine longueur, car on doit avec des charges d'un volume aussi grand, employer une poudre brulant lentement surtout dans des pièces construites en fer forgé pour n'avoir pas a augmenter outre mesure l'épaisseur et le poids des bouches à feu.

Cependant, et c'est ce qu'on est à faire, en substituant au fer forgé l'emploi de l'acier dans les pièces de tous calibres, on obtient des canons plus légers en même temps aussi solides et permettant de se servir de poudre plus vive et d'obtenir par là des résultats mécaniques plus puissants.

Il n'y a pas très longtemps que l'emploi de l'acier dans la fabrication des pièces d'artillerie est devenu presque général.

Cependant Herr Krupp, dès 1847, fabriquait des canons d'acier et en 1855 il soumettait au gouvernement Prussien, une pièce rayée faite entièrement de ce métal. En 1867 il construisit une pièce en acier de 14 pouces et du poids de 50 tonnes, qui fut soumise à des épreuves très sérieuses et donna des résultats remarquables.

Sans entrer dans des détails qui nous entraineraient trop loin, remarquons, en passant, que la construction des piéces en acier d'un calibre élevé, présente de grandes difficultés surtout lorsqu'il s'agit de produire des lingots d'un métal parfaitement homogène, d'un poids considérable qui s'élève dans certains cas à 20 tonnes et plus.

Quoique je ne veuille pas faire disgression dans le domaine de la métallurgie, je ne puis cependant me dispenser de dire un mot sur un sujet qui se relie si intimement à l'art de la construction des pièces d'artillerie de notre époque, je veux parler de la production de l'acier.

Par quel mystérieux effet, dans la cémêntation, le fer se trouve il changé en acier lorsqu'il est chauffé, dans certaines conditions, en contact avec le charbon ? La chimie moderne n'a pu encore le découvrir. Elle se contente de constater le fait et par l'analyse elle détermine que le fer s'est combiné a 1 pour cent de carbone pour devenir acier. Le procédé suivi par Krupp, à Essen, jusqu'à

ces dernières années, consistait dans l'emploi de l'acier ainsi cémenté en barres, puis rompu par morceaux de certaines dimension, et à le fondre dans des creusets de 30 livres environ chauffés a température de fusion dans des fourneaux spéciaux. Ce procédé, dont un des moindres inconvenients était de nécessiter l'emploi de plusieurs centaines d'hommes pour couler des lingots d'un poids de 16 tonnes, a été heureusement remplacé par le procédé Siemens Martin qui permet de couler d'un seul jet et dans des conditions bien plus économiques, des lingots d'acier d'un grand poids et d'une qualité parfaitement homogène. Le procédé Siemens Martin consiste essentiellement en un système de fournaises, alimentées par des générateurs de gaz et pourvues de chambres dites régénératrices de chaleur, qui peuvent fondre et transformer sur leurs vastes soles des quantités considérables de fonte ordinaire auxquelles on ajoute dans le cours de l'opération, les substances requises pour produire la carburation nécessaire à l'aciérification de la masse.

A Sir Joseph Whitworth de Manchester, revient l'honneur d'avoir le premier traité l'acier ainsi produit et encore à l'état liquide, par la compression de puissantes presses hydrauliques, soumettant ainsi l'acier liquide contenu dans un moule d'une solidité suffisante et des dimensions requises, à une pression s'élevant quelquesfois à 6 tonnes au pouce carré. Il produit ainsi des lingots d'acier parfaitement homogène, dont le poids s'éleve souvent à 45 tonnes et plus.

Cette compression chasse du métal toutes bulles de gaz ou impuretés qui pourraient s'y rencontrer et qui seraient dans le cas de produire des stries ou des cavités dans le métal et developper ainsi des points faibles qui le rendrait impropre, entre autres usages, à la constructions des pièces d'artillerie.

On voit donc jusqu'à quel point, les progrès de la métallurgie, dans ces dernières années, ont eu d'influence sur le perfectionnement de l'art de construire les pièces d'artillerie moderne.

Ainsi, par le procédé Whitworth, l'acier liquide soumis à une pression énorme, se coagule sous l'effet de cette pression, se refroidit et sort du moule qui l'a contenu, une

masse de métal dense, pur, homogène capable de soutenir au besoin, après qu'il aura été forgé par la forge hydraulique, une tension, sans se rompre, de 98 tonnes au pouce carré.

Voici en effet encore un procédé tout particulier en usage dans les ateliers Whitworth, ailleurs on forge sous le choc de marteaux à vapeur, Whitworth substitue à ce choc l'effet d'un comprimeur, ou forge hydraulique, si je puis ainsi l'appeler.

Au choc se substitue la pression continue, perséverante et irrésistible, d'un piston mû par une forte pression d'eau dans un cylindre très solide. Sous cette pression, les molécules du métal préalablement porté a une haute température, se rapprochent dans toute la masse qui en même temps prend la forme requise pour devenir soit un tube interne, ou une frette, ou toute autre partie constituante d'une pièce d'artillerie. Car on conçoit qu'il ne s'agit plus de couler ou de forger d'une seule pièce nos canons modernes. Des difficultés sans nombre surgiraient dans l'exécution d'une fabrication de cette nature et les moyens actuels de l'industrie ne sauraient en garantir le succès. Il faut construire par sections, ces énormes bouches à feu. Encore n'y a t'il pas bien des années, qu'en Angleterre on dût se résigner à employer un tube interne en deux sections pour les canons de 100 tonnes construits par Armstrong & Cie. Aujourd'hui, mieux outillés, on réussit à faire pour les pièces même les plus considérables, des tubes internes coulés en un seul lingot d'acier, forés, ensuite rayés et finis dans des tours d'une puissance énorme.

Voici en peu de mots le mode de construction adopté généralement, à présent, en Europe : ayant pour base un tube interne en acier de dimensions déterminées par le calibre de la pièce projetée, on glisse à chaud sur ce tube un manchon ou frette aussi en acier auquel s'attachent les tourillons et ce manchon, en se refroidissant, éprouve un retrait qui le fixe à demeure sur le tube interne qu'il entoure. Sur ce manchon ou frette, s'adaptent un nombre variable d'anneaux, de largeur et d'épaisseur convenable, qui se fixent aussi à chaud et qui, par leur retrait, produisent finalement une construction parfaitement solide et

présentant une résistance très considérable aux chocs disruptifs produits par l'explosion des charges (voir figure).

En se rappelant que ces forces disruptives s'élèvent à 18 tonnes au pouce carré et parfois à plus, on ne peut douter de quel importance, dans la construction de nos pièces modernes, devient le choix des matériaux aussi bien que leur disposition et la précision dans leur fabrication et dans leur emploi.

Aussi voit-on dans ces grands établissements, à Woolwich, chez Armstrong et Whitworth en Angleterre; à Ruelle, à Bourges, à St-Chamond, au Creusot en France, ainsi qu'à Essen chez Krupp, les instruments les plus exacts mis en usage pour déterminer les qualités physiques des métaux destinées à la fabrication des pièces d'artillerie, en même temps que, dans le laboratoire, on étudie leur composition chimique avec des précautions minutieuses.

Le temps me manque pour décrire ces instruments aussi ingénieux que perfectionnés, qu'il me suffise de dire qu'avec ces instruments on essaie chaque lingot d'acier avant que de le mettre en usage.

La pièce ainsi construite, est soumise à des épreuves pour déterminer sa solidité et ses qualités ballistiques. Ces dernières épreuves sont indispensables surtout pour l'adoption de nouveaux modèles. Car l'artilleur aura pu déterminer mathématiquement certaines conditions qui ont dû guider dans la construction de la pièce, mais restent des données à obtenir qui ne peuvent être acquises que par la voie expérimentale.

Quelle poudre emploira t'on,de quelles dimensions seront les projectiles, leur forme, leur poids, tels sont les problèmes qu'il s'agit de résoudre. A l'aide d'instruments ingénieux, dans lesquels l'électricité enrégistre, au millième de seconde près, les unités de temps relativement aux espaces parcourus, l'artilleur détermine les vitesses imprimées aux projectiles dont il peut ainsi déduire l'énergie et les trajectoires sous différents angles de tir. Avec le télephone et le chronomètre, il peut vérifier l'exactitude des calculs qu'il aura faits pour établir la vitesse de translation du projectile dans son trajet de la pièce à un point déterminé.

Avec le *Crusher gauge*, cette invention si simple et cependant si exacte dans les données qu'elle fournit, l'artil-

leur mesure les pressions normales et anormales qui peuvent se produire dans l'âme de la pièce, à l'instant de l'explosion de la charge ou a tel et tel point du trajet du projectile dans le canon.

Ainsi, à chaque pas, la science vient en aide à l'artilleur dans sa profession, il ne peut pas plus s'en passer que le marin de sa boussole. Pour conduire ces expériences, de vastes champ de tir sont absolument nécessaires. Celui de Meppen, annexe de la grande fabrique de Krupp, a 10 milles de longueur et 2 milles et demi de largeur, il est pourvu de plateformes, cibles, hangars, magasins à poudre, laboratoire, téléphones, lignes télégraphiques, chronographes, observatoires et de tout, enfin, ce qui est nécessaire pour assurer le service le plus parfait.

On ne s'étonne pas de cette prodigalité de moyens accumulés pour éprouver et améliorer les pièces d'artillerie Krupp, lorsque l'on se rend compte de la vaste étendue et de l'importance de la fabrication qu'il s'agit de contrôler et de diriger. Les ateliers Krupp employaient en 1883, 20,000 ouvriers et assuraient la subsistance de 65,381 personnes. Il est vrai de dire qu'on n'y fabrique pas exclusivement des pièces ou du matériel d'artillerie, cependant la plus grande partie de la production des ateliers Krupp se rattache à ce genre de fabrication.

L'établissement des messieurs Schneider & Cie, en France, est à peine moins considérable, 15,000 hommes y sont employés et le Creusot forme un centre de population de 30,000 âmes qui subsiste par l'exploitation des usines des Schneider.

La philantropie la plus éclairée, a guidé ces industriels remarquables, dans leurs rapports avec leurs ouvriers. Ils ont construit une cité ouvrière de plus de 2000 habitations bien bâties et dans des conditions hygiéniques parfaites, qui sont louées aux ouvriers qu'ils employent, à raison de 5 o/o par an sur la valeur et avec privilège d'achat.

Chaque employé et sa famille recoivent les soins gratuits du médecin et en outre une indemmité durant la maladie, un hôpital parfaitement aménagé fait partie de l'établissement, auquel sont attachés plusieurs médecins et chirurgiens, aidés d'un personnel de religieuses comme garde malades.

Appréciant pleinement les effets salutaires d'une bonne Education, d'excellentes écoles et des Eglises spacieuses ont été bâties dans les différents quartiers du Creusot et quoique l'instruction ne soit pas, dans un sens, obligatoire, cependant elle l'est de fait, car personne n'est admis à travailler dans les usines, qui ne sache au moins lire et écrire. Ce système d'éducation a une part influente dans le succès et le développement industriel du Creusot,

La question des salaires n'a jamais fait surgir de difficultés entre la main d'œuvre et le Directorat, et comme les salaires vont en augmentant avec le temps de service des ouvriers, salaires auxquels s'ajoutent des boni dans les cas de superiorité marquée dans la quantité et la qualité du travail des individus, nul part ailleurs trouve-t-on une classe d'ouvriers plus habile, plus intelligente et plus satisfaite, aussi chacun travaille-t-il avec ardeur comprenant qu'il a sa part dans la responsabilité du succès.

Mais, pour en revenir plus immédiatement à mon sujet, je dois vous entretenir d'un mode de fabrication des bouches à feu qui, par son originalité et le succès qu'il semble promettre, mérite d'attirer notre attention.

Ceux qui ont pu lire les campagnes de Gustave Adolphe contre le Danemarck, la Suisse et la Pologne, dans des ouvrages spéciaux tel que dans Greweintz ou dans Harte " Life of Gustavus Adolphus ", se rappeleront sans doute avec quels avantages ce grand militaire se servit de son artillerie de campagne armée de pièces très légères en cuivre recouvert de plusieurs épaisseurs de cuir et de corde de chanvre fortement enroulée, pour leur donner plus de solidité sans les alourdir. On se représente presque, n'est ce pas,les canons de bois de nos vaillants de 37 et 38.

Cette idée du Souverain Suédois semble avoir été reprise, à deux siècles d'intervalle, par le capitaine Schultz de l'armée française. Celui-ci substitue cependant avec avantage aux couches de cuir et de corde enroulées autour d'un tube interne, un matériel plus résistant, consistant en spirales de fil d'acier enroulé avec une tension suffisante sur un tube interne d'acier, qui forme noyau et sur ces couches de fil d'acier ainsi superposées, s'applique une frette glissée à chaud et qui par son retrait,en refroidissant, se lie intimement à tout l'appareil qu'elle maintient dans

un état de solidité remarquable. Cette frette porte en même temps les tourillons qui servent à fixer la pièce sur son affut. Seulement, il se présentait une difficulté dans le système Schultz, qui semblait devoir le faire rejeter tout à fait. Le canon Schultz résistait parfaitement aux tensions disruptives latérales, mais quoiqu'on eut eu recours, pour résister aux pressions dans la direction de la culasse, à l'emploi de fortes tiges en acier boulonnées à deux frettes solidement fixées, l'une à hauteur des tourrillons et l'autre à la culasse, la pièces succomba dès la première épreuve qui s'en fit à Gavre en 1883.

Presque en même temps Sir William Armstrong construisait, en suivant le même système, une pièce d'un calibre de 10 pouces ¼, mais aux couches de fil d'acier enroulées transversalement à la pièce, il ajoutait plusieurs autres couches longitudinales agraffées dans des manchons ou frettes fixées au tube interne et, pour ces fils, il adoptait divers modes d'agraffes qu'un regard sur la figure fera facilement comprendre. Le fil dont Armstrong se sert n'est pas rond ; il affecte la forme trapezoide.

La charge de cette pièce est de 220 livres de poudre le projectile pèse 404 livres, la vitesse initiale est de 21 60 pieds à la seconde et la pression à l'intérieur est de 17 tonnes au pouce carré.

Cette question pleine d'actualité, savoir : reduire le poids des pièces au minimum tout en augmentant au maximum leur résistance au choc d'explosion, s'est transportée en Amérique. On s'occupe de construire pour le département de la marine des Etats-Unis une pièce dont voici la description : elle est d'un calibre de 6 pouces et consiste en un tube interne de 15 pieds de longueur, d'une frette, dite *jacket* de 7 pieds 3 pouces et d'enveloppes consolidantes en fil d'acier enroulées a peu près dans les mêmes conditions que ses prototypes Français et Anglais.

On a préparé des devis pour construire une pièce de 8 pouces d'après le même système, destinée elle aussi au Département de la marine des Etats-Unis. Le poids de cette pièce serait de 26,500 lbs tandis que la même pièce en acier avec frettes solides aurait pesé 27,500 lbs, soit 1,000 lbs de plus.

Malheureusement ce mode de construction qui exige un outillage comparativement peu compliqué, dont les pro-

duits semblent offrir des garanties de solidité tout à fait suffisante, est encore dans la période expérimentale et on ne peut prévoir quand il en sortira. Tout dépend du perfectionnement qu'on pourra effectuer dans les machines qui servent à enrouler les fils métalliques sur la pièce. Là se présente une difficulté qui n'a pu encore être surmontée.

Obtenir des effets mécaniques considérables avec des pièces relativement légères ; tel est le problème à résoudre à l'heure qu'il est. D'aucuns croient entrevoir la solution en employant des explosifs violents pour charger les projectiles de calibre restreint qui produiraient ainsi les mêmes résultats que des obus d'un calibre plus puissant, lancés à grande vitesse, par des pièces de dimension et d'un poids en rapport avec le projectile dont elles sont pourvus.

L'invention de la dynamite par Nobel, et presque en même temps la découverte du pyroxile ou fulmi-coton ou coton-poudre, c'est tout un, avaient ouvert des horisons inconnus jusque là dans le domaine des substances explosives. La poudre à canon avait dû seule auparavant, fournir ces forces formidable que réclamait l'art militaire et l'industrie. Aussi la dynamite Nobel était-elle à peine connue, qu'on cherchait déjà à l'appliquer au chargement des obus. Dans tous les pays du monde on chercha ainsi à adapter les grands explosifs aux besoins de l'artillerie.

Les premiers essais en France, furent faits pendant la guerre de 1870. Les expériences des officiers d'artillerie au polygone de Vincennes et à Saint-Ouen, démontrèrent que l'on pouvait obtenir des effets considérables en chargeant les bombes et les obus avec un poids de dynamite égal au tiers et même au quart de la charge de poudre noire règlementaire. D'une part le fractionnement de l'obus était beaucoup plus grand, l'effet de disruption dans un corps quelconque qu'il pénétrait, beaucoup plus considérable et enfin étant moins chargé le projectile pouvait comporter des dimensions réduites. On entrevoyait donc ainsi la possibilité de faire usage de canons de petit calibre tout en obtenant de plus grands effets.

Des expériences analogues étaient conduite en Suède, en 1871, avec beaucoup de soin et de méthode ; on fesait usage de canons Krupp de trois pouces, l'obus contenait

⅞ de livre de dynamite et la pièce recevait d'abord une charge réduite que l'on porta peu à peu à la charge normale, qui, malheureusement, produisit l'éclatement prématuré de l'obus et la destruction complète de la pièce.

La dynamite n'avait pu, sans éclat, supporter le choc produit par l'explosion de la charge règlementaire de la pièce.

On reprit cependant les expériences, en réduisant le poids de la dynamite à ⅛ de livre et cette charge fut renfermée dans un tube en cuivre, introduit dans l'obus qu'ensuite on emplissait d'eau ; on cherchait ainsi à éviter l'effet dû à l'échauffement subit de la pièce ainsi que le choc direct résultant de l'inflammation de la poudre dans la pièce. Enfin, pendant ces dernières années, des essais ont été faits aux Etats-Unis par monsieur Snyder et le général Kelton. Il avait été bien reconnu, dès les premières expériences, dont nous venons de parler, que pour pouvoir utiliser la dynamite dans les obus d'artillerie, il fallait que l'explosion de la charge propulsive de la bouche à feu, produisit un choc modéré, qu'autrement la dynamite de l'obus fesait explosion dans la pièce même,

C'est cet effet peu désirable que Messieurs Snyder et Kelton voulurent prévenir en interposant des coussins de disposition spéciale, destinés à absorber et amortir le choc entre la charge de la pièce et l'obus à dynamite.

Les essais furent assez satisfaisants.

Pendant les derniers mois de 1884, d'autres expériences furent faites, aux environs de Washington, avec des obus chargés de gélatine explosive. Un canon de 15 centimètres, environ 6 pouces, se chargeant par la culasse, lançait de obus contenant 13 lbs et ¼ d'explosifs. Pour amortir les choc initial on avait adopté le dispositif suivant : l'obus pénétrait à moitié, dans un cylindre alésé en acier qui s'ajustait dans l'ame du canon, dans ce cylindre, étaient serrées, formant coussin derrière l'obus, quatre bandes en caoutchouc, celles ci séparées les une des autres par de minces rondelles d'acier qui égalisaient la compression entre toutes les bandes.

Le premier coup tiré, fut dirigé sur une cible, que l'éclatement du projectile reduisit en miettes et on tira ensuite sur une grand rocher à mille verges, l'obus fit

explosion en brisant la roche dans un rayon de près de 30 pieds produisant une énorme quantité de déblais ; un second obus atteignant le centre même du rocher y fit une ouverture de 23 pieds de diamètre et 6 pieds ½ de profondeur.

En résumé toutes les expériences faites jusqu'à ce jour, démontrent, qu'en fesant usage d'obus chargés à la dynamite, ou autres grands explosifs, on peut obtenir avec des canons de petit calibre, des résultats plus considérables encore que ceux donnés par la poudre et les plus puissantes pièces dont dispose actuellement l'artillerie.

Mais l'établissement d'un projectile à dynamite est un problème d'une solution difficile et si on a pu réussir à lancer avec des bouches a feu d'un calibre relativement restreint, des obus à dynamite dont l'effet a été comparativement très grand on n'a pas encore pu cependant parvenir à s'assurer l'emploi de gros projectiles chargés de 40 à 50 livres d'explosifs, et c'est pour réaliser ce type que Zalinski; de l'armée Américaine, a inventé son fameux canon pneumatique, qui a causé tant d'émoi il y a quelques mois.

Je terminerai messieurs en soumettant à votre examen, quelques uns des grands explosifs dont nous venons d'entrevoir quel parti on peut tirer dans les guerres de l'avenir et aussi en disant quelques mots de leur nature et de leur emploi.

La nitroglycerine qui sert de base à un grand nombre d'explosifs plus ou moins puissants, a été découverte par le chimiste Italien Sobrero, dans le laboratoire du célèbre Pelouze à Paris. L'ingénieur suédois Nobel qui vient de mourir à Cannes, réussit à la préparer en grande quantité par un procédé rapide et à la fois peu dangereux, mais à la suite d'accidents graves survenus dans le transport et dans sa mise en usage, Nobel fut amené à l'utiliser sous forme de dynamite, c'est à dire en la fesant absorber par une matière poreuse inerte.

La glycerine pure est un liquide huileux d'un jaune claire, presque incolore. Elle est sans odeur mais d'une saveur brulante et possède, même à petites doses, des proprietés vénéneuses très marqués aussi les ouvriers chargés de la préparer souffrent-ils, surtout en commen-

çant leur métier de maux de tête et d'accablement général et l'organe visuel devient chez eux d'une sensibilité extraordinaire.

La nitroglycerine explose quand on la chauffe à 150 degrés ou quand elle est soumise à l'action d'un choc violent comme celui d'un marteau ou celui qui résulte de la détonation d'une capsule au fulminate de mercure,

Nobel considérait 1 volume de nitroglycerine comme équivalant à 13 volumes de poudre. Ce sont des résultats théoriques qui ne sont qu'approximativement confirmés dans la pratique. L'industrie prépare la nitroglycerine en traitant de la glycerine par un mélange d'acide nitrique et d'acide sulfurique. La réaction produit un fort dégagement de chaleur qu'il faut combattre par des moyens réfrigérants, car si la température s'éleve audessus d'un certain degré, le mélange commence à donner des vapeurs rutilantes et le thermomètre monte avec une très grande rapidité jusqu'à ce que la masse ait atteint la température d'explosion, c'est généralement ainsi que se produisent les accidents dans les fabriques de dynamite.

La dynamite est donc essentillement un composé de nitroglycerine. Elle est dite à absorbants chimiquement inertes ou à absorbants actifs.

La dynamite de la première catégorie, consiste en une terre infusoire, tel que la Kiéselguhr, que l'on touve en grande quantité en Saxe, et qui est imbibée de nitroglycerine qu'elle retient par sa capillarité ; en voici un petit échantillon.

La dynamite de seconde catégorie consiste en une matière explosive par elle même à laquelle se trouve mélangée de la nitroglycerine, ainsi Nobel, en mélangeant du coton poudre avec de la nitroglycerine dans des proportions de 7 de coton pour 93 de nitroglycerine, obtint une substance appelée dynamite-gomme ou gélatine explosive.

C'est un composé gélatineux, élastique jaune clair dont nous venons de constater l'énergie en rappelant les expériences faites à Washington. Il est plus stable que la dynamite ordinaire, surtout au point de vue physique, car il ne donne lieu à aucune exudation même par la pression. Qualité précieuse considérant que dans un cas d'exudation avec la dynamite ordinaire on se trouve dans une situation

aussi dangereuse que si l'on manipulait de la nitroglycerine pure.

La nitrogélatine est encore un autre composé de nitroglycerine à base active, dont voici un échantillon. Cet explosif se compose de nitroglycerine gélatinisée au moyen d'une nitro cellulose soluble et méiangée avec une poudre binaire.

Ces nitro celluloses solubles sont produites en traitant le coton ou toute autre substance contenant de la cellulose avec un mélange d'acide nitrique et d'acide sulfurique en certaines proportions. On obtient ainsi un produit moins nitrifié que le fulmi-coton et cependant trés explosif, qui se mêle bien à la nitroglycerine qu'il gélatinise.

On préfère la nitrogélatine à la dynamite ordinaire non seulement pour sa plus grande énergie à poids égaux mais surtout parcequ'elle laisse difficilement suinter la nitroglycerine ce qui lui assure une immunité presque absolue.

Comme je le disais il y a un instant, ces grands explosifs à moins d'être portés soudainement à une haute température, ou d'être soumis à un choc violent, n'exploseront pas.

Il faut donc dans la pratique employer quelque explosif violent, facile à mettre en action et qui déterminera par le choc qu'il produira au milieu de la masse de la charge explosive proprement dite, l'explosion qu'on veut obtenir.

On se sert à cet effet, de détonateurs de formes diverses mais dont le principe est le même savoir : une certaine quantité de fulminate de mercure, contenue dans un cylindre de métal ou tout autre réceptacle et auquel on met le feu par une amorce, ou par une étincelle électrique produite par une pile ou une machine électrique d'un dispositif approprié.

Voici un échantillon de fulminate de mercure préparé à la Cartoucherie, nous avons dû entreprendre de fabriquer le fulminate que nous employons pour remplir les capsules-amorces des munition produites à Québec, les Compagnies de transports océaniques ne voulant pas se charger d'un passager aussi incommode.

J'ajouterai quelque mots sur l'utilisation, dans l'artillerie, pour le chargement des obus, d'une substance qui ne produit pas il est vrai des effets aussi destructeurs que la dynamite mais qui n'exige pas non plus, une manipulation

aussi délicate et surtout des appareils spéciaux pour en rendre l'usage moins dangereux, je veux parler du picrate de potasse.

On obtient avec des obus chargés de cet explosif des effets disruptifs bien plus considérables qu'avec la poudre ordinaire et la manœuvre ainsi que le chargement des pièces exige aucun changement dans la pratique actuelle.

Je soumet à votre examen une petite quantité de ce picrate que j'ai préparé au laboratoire de la Cartoucherie. Cette préparation est très simple offre peu ou point de dangers, peu n'est pas dispendieuse, n'exige pas d'appareils compliqués, n'est pas insalubre et emploie des ingrédients peu couteux ; cette substance, à bien des points de vue, est digne d'attirer l'attention de nos autorités militaires et de nos officiers d'artillerie.

Avec des armements de faible calibre comme les nôtres, rien ne devrait être négligé de ce qui augmenterait l'efficacité de notre artillerie. Nos pièces de campagne lançant des projectiles de 9 chargés de picrate deviendraient alors aussi redoutables que des pièces de 16 et nos canons de 64 avec des obus ainsi chargés, équivaudraient à des pièces d'un calibre bien plus puissant. Car pour battre en brèche, pour détruire les épaulements, aussi bien que contre le matériel et le personnel dans les sièges et en campagne, l'efficacité de l'obus est en raison directe de la violence de son explosion. Je ne fais pas allusion, bien entendu aux Shrapnels ni aux obus spéciaux employés à perforer les blindages de fer ou d'acier, quoique même dans ce dernier cas, la charge explosive de poudre pourrait avantageusement être remplacée par le picrate.

Mais hâtons nous d'ajouter que ce ne sont là que des palliatifs à l'état morbide dans lequel languit notre artillerie, armée de pièces de la plus haute antiquité. On n'improvise pas l'artillerie et les armements. Il est trop tard, au moment du danger, de se pourvoir de pièces de types modernes auxquels le personnel d'artillerie est resté parfaitement étranger jusque-là.

Ceux qui s'occupent de leur métier, savent à quelles graves déceptions peut conduire ce conservatisme outré, et puisqu'on reconnait, assez généralement, qu'il est nécessaire de maintenir sur pied des corps d'artillerie, au moins devrait-on les armer convenablement.

Il me reste messieurs à vous remercier de votre bienveillante attention, à m'excuser de m'être laisser entrainer dans des détails techniques qui n'ont peut-être pas interessé tout l'auditoire, cependant, les différentes armes sont maintenant tellement liées dans le service, que le cavalier et le fantassin ne savent pas si les circonstances, dans une certaine mesure, ne les obligeront pas, à un moment donné, d'empiéter sur les fonctions de l'artilleur et *vice versa* Rien de ce qui intéresse les uns, devrait donc, à mon dire, être indifférent aux autres.

OSCAR PRÉVOST,
Major.

II

LECTURE

Delivered before the members of the Quebec Garrison Club, on the 27th December 1888 by Wm. A. Ashe, Esq., F. R. A. S.

SUBJECT :—"THE ESKIMOS OF HUDSON STRAITS."

GENTLEMEN,

On being requested to read a paper before you, I was naturally well pleased at the privilege that was about to be allowed me ; but, when coupled with this, came the further one, that I should take for my subject, "something about the Eskmos", I was temporarily apalled at seemingly insatiable appetite of a Quebec audience for the subject; because, I am very much afraid, that I have said pretty nearly every thing that I have to say on the subject. I received some consolation in the recollection, that on this occasion I am supposed to be addressing an entirely new audience ; so that if there are any among you, who will be reminded that you have heard something very like this before, and unfortunately from the same speaker, you are requested to remember that I have not been to Hudson's Straits since last I had this subject under treatment, and that I am equally conscious with yourselves of the striking similarity between myself and the thrifty house-wife, who, on a small weekly allowance, produces a "joint" for Sunday, has it cold on Monday and Tuesday, hashed on Wednesday, and somewhat disguised by being "curried" on Thursday; wondering, at this time, what on earth she will do with it for the rest of

the week, or even what she will say, if her lord and master returning from the office, after an unsatisfactory day's business, should make her, if possible more fully conscious of the limited variations of which, "mutton" we will say, is capable, by some such unfeeling remark, as, "what! mutton again ?"

My Eskimo, as I now begin to feel them, inhabit the northern portion of this continent, from south of Behring's Straits, through the northern mainland of this continent, the shores of Hudson's Bay and the lands forming the shores of Hudson's Straits ; then there are the Greenland Eskimos, with whom we have nothing to do at present, for, whilst they probably represent a common origin, the relatively large water space consisting of Davis' Strait, prevents that freedom of intercourse between the several tribes, which is necessary to the maintenance of uniformity in the customs aud habits of a distributed nation. Of course there will be many points of similarity between them : originating from a common stock and occupying such isolated positions, customs and habits carried with them in their exile, can have undergone little alteration because of outside influences ; whilst the individual, surrounded by practically like conditions of living and climate, will have developed or maintained similar characteristics.

Hudson's Straits, the locality of the particular Eskimos that I wish to describe, is situated about 1000 miles to the North of Quebec : it is therefore to the North of the limit where trees will grow ; this point, although generally given as being situated at Cape Chidley, the South-eastern extremity of the Straits, is in reality much further to the South, as far as the timber growth within a reasonable distance of the shores is concerned. The shores of the Straits themselves then, have the most dismal appearance being entirely composed of the barren rocks, with, in the sheltered nooks, a very sickly growth of moss. Of soil, such as we know it, there is absolutely none, so that the foundations of the world, as we may so call them, are as evident today, and the different levels at which the waters of the world have stood, as evidenced by the sandy and pebbly beaches that are seen, as though the waters had

ebbed but yesterday and would flow again to-morrow ; or, as though it were but the merest interval of time since those masses of granite, or more properly speaking "gneiss", had undergone the contortions that are so distinctly evident.

Such are the present surroundings of the people we are discussing — surroundings that they have accustomed themselves to after fruitless frighting, with their old time enemies the Indian, for a country that extended inland in the directions already mentioned, and which continued south-wards along the whole of the Labrador coast, well up in to the St. Lawrence, and possessed advantages in climate that seemingly even tradition has ceased to remember ; so that it is stated, if an Eskimo were brought to live, in what is known as civilization, the change in condition would be so great that existence would be impossible, as a few attempts at his civilization seem to have proved. The Eskimo then, seem to be fated to live and become extinct in their present situation ; an end that is inevitable because of the increasing difficulty of obtaining their food supplies owing to the encroachment upon their hunting grounds, by the whaler and sealer, which has resulted in the wholesale slaughter of their principal staple, the seal ; and the increasing difficulty of approach to the remainder on account of being so constantly disturbed by these hunters ; and, above all, because of the smallness in number of their families, which rarely exceed two ; who, having to contend with most of the ills that childhood is subject to elsewhere, in addition to imperfect nourishment through youth, and hardships at all times, are to small a number to fill the gaps that death occasions amongst them.

When we first took up our residence in their country, we were very uncertain as to the sort of people that we had to do with. The general opinion of those who like ourselves were going to live amongst them, was, that they were a particularly treacherous nation, and that every precaution should be taken to guard against deserving their enmity. With such a possibility in prospect, nearly every member of the several parties who were going to stay out there, supplied themselves with an Eskimo dog

from the first of their settlements that we reached. I have since not ceased to be thankful that the members of my party did not get in their supplies in this direction before the market was bought out. Oh yes, I was in time to get one for myself—even if I had not, some of the parties who had a superabundance, even at that time, would have taken pity on my helpless condition, and given me one of theirs, rather than see me left to the mercies of the midnight prowlings of the treacherous Eskimo. None of us bought full-grown dogs, as it was to be supposed that their sympathies would be with the prowler, and against ourselves. There is nothing specially characteristic about the developing Eskimo dog; all his qualities lie dormant. I thought, — we all must have thought, — that careful rearing, away from the demoralizing influences of his kind, would develop such an animal as would be faithful to any small trust, such as the care of the house in our absence. It shortly happened that this trust had to be imposed upon him - We all had duties away from the house, so we left it in his charge. Now, I wish to give every scrap of credit to the Eskimo dog, that could be claimed for him by any possible admirer of his here, so I will admit that the *house* was all right on our return to it— but everything within his reach—excepting of course the coal-stove, which, with all articles of the same difficulty of substance, were intact —but such trifles as one's boots, stockings and wearing apparel, had been mutilated. I did not so much mind his eating the men's boots or clothing; what I did object to was the depravity that must be contained in the organism that indulged in such promiscuous feeding. If he wanted boots, why not eat a pair? Not the tops off three or four. After this, when we had to go abroad, we divided our forces: we kept our surplus clothing inside the house and the "organism" outside.

When we at last got to know the Eskimo by experience, we found that he was far more to be trusted than his dog.

Having given you some of the characteristics of his dog, let me give you some of those of the Eskimo himself, as we observed them.

In appearence he is not altogether pleasing, being very short and, almost as broad as he is long, an effect that is

largely produced by the quantity of clothing that the severity of the climate obliges him to wear. The average height for the men is within a small fraction of 5' 3", whilst the women barely average five feet. The temperature of their bodies is somewhat higher than that of ours, owing entirely to the warmth producing nature of the food that they eat. I should have gone further into this and similar questions whilst out amongst them, because of the interest attached to such facts, had it not been for the extremely limited supply which I had of their language during the earlier part of my stay; afterwards sickness prevented my doing so. You can perhaps imagine the difficulty of explaining, in a terribly foreign tongue, that your approach, with a glittering thermometer in your hand, which you wish your subject to take into his mouth and hold under his tongue, will be unattended with any danger; but, nothing other than the most lavish expenditure of tobacco, (which he must hold in his hand to occasionally receive assurance from at moments when you gaze intently at the column of mercury to see whether it has reached its highest point, and which he suspects are crises of a totally different nature,) would induce him to undergo the ordeal. This you can perhaps imagine, but I defy you to picture the terrified look, or the intenseness of the way in which he watches you for the first signs of a suspicious movement on your part. I am afraid that they concluded that I was not quite in my right mind, and that on this account was to be very much respected, and at all times consulted on matters connected with the chase—my reputation in this respect suffered some little damage, as I did not know a great deal about what the following years food supply was likely to be, or where to get the necessary information, so that for a long time I was content to explain that I did not know anything about the matter; but there was no use in any such assertion, as they beleived that the individual who was familiar with the uses of the somewhat complicated looking meteorological instruments which we had, must be witholding his information for a higher price, so that finally they undertook to bribe me — then I had to give way; and by giving the information that each seemed to

expect, have no doubt that even yet they have not quite found out whether I was most certain or uncertain in my predictions.

If I have left a doubtful reputation behind me as a seer, there can be no question as to the lasting nature of that I obtained as a medical man. I do not wish you to understand that I have a natural bent in this direction ; on the contrary, the little information I had on the subject was obtained by no inconsiderable effort on my part, from the lectures that each of us had to undergo, on the passage out, at the hands of the Surgeon of the expedition ; where, in the cabin of the vessel, each day we took distracting notes, which we carried away with us in the form of ruled pages which headings such as : "Toothache" "symptoms" "treatment", "dose" , "diet". And I should further add, that the column headed "dose" contained figures which corresponded with similar ones in our medecine chest ; this column then might have entered such a fact or series of facts, as, that, "three drops of 16 with half a tablespoon full of twenty-seven", were to be shaken before taken and were guaranteed as a certain cure for the above indications. The facts were all right enough, but there should have been added a "rider", to the effect that the dose for an Eskimo was half that for infant. This of course we all found out for our ourselves, there was no mistaking the fact, but in the meantime the Eskimos *did* suffer, and our several reputations as powerful-medecine men correspondingly increase.

But I am forgetting my description of the Eskimo. Short in stature, they have the eyes of the chineese, with their upward turn at the outer corners ; high cheek bones, little or no bridge to their nose, medium sized mouths and lips, no hair on their face, and a complection with is, seemingly, a combination of the yellows in the chinese and the copper of the indian. Patient — it is only necessary to watch some of their hunting operations, as we shall describe further, to be convinced of this. Intelligent with an intelligence that in my opinion far exceeds that of their neighbor the indian, being more nearly intelligence than cunning, which I take to be the difference between their

respective mental activities. We were only three white-people in our party, so we taught some of the Eskimo, "Eucre", and so could quite often play four-hand; and it was not always the side that had an Eskimo for a partner which lost. In playing "draughts" or "checkers" they became rapidly proficient up to a certain point; but never seemed capable of seeing the game further than a couple of moves ahead, and shewed the highest sense of appreciation for any combination that was put in operation against them which consisted of a greater number.

Of their language, I have very little to say, as my command of it was so small and precarious that, although finally sufficiently proficient to carry on ordinary conversation with them, it was done with utter contempt for grammatical form; and I have no doubt but that I outraged every rule they had. You must not suppose that this contempt for their grammar was wilfully acquired—I dropped into this condition, purely because the difficulties in convincing an uneducated nation that they have a grammar in the first place, and learning from them what these unwritten and unknown rules are, was simply beyond my capacity. You must not suppose that I came to this conclusion without an endeavor to master the subject. I tried several times, and have a very distinct recollection of the failure that resulted in one particular case; and am quite certain that my subject has yet, at times, vague wonderings, as to what on earth I was driving at on that occasion. Before giving you this example of my want of success in this direction, let me give you the result of a similar investigation, which took place in civilization, and is copied from *The Saturday Review*. It is entitled "a horse case".

"It was a horse case. Horse cases are difficult to deal with, and in the course of the trial a horsey looking individual was put in the box. Counsel asked him what happened. Witness — "I ses, ses I, How about the hoss? and he said he'd give me 10s. to zay nothing about un". Counsel — He did not say, He would give 10s. Witness— Yes a did, that's exactly what a did zay. Counsel — he could not have said "he", he must have spoken in the first person. Witness — No: I was the first person that

spoke. I ses, ses I, How about the hos? Counsel — But he didn't speak in the third person. Witness — There was no third person present, only he an me. The Judge here interposes, saying — Listen to me, witness. He could not have said, He would give you 10s. to say nothing about it, but "I" will give you 10s. Witness — He said nothing about your lorship. If he zaid anything about your Lordship *I* never heered un. And if there was a third person present *I* never seed un". The witness was allowed to stand down.

You must understand that I had not seen this extract before the experience that I am about to tell you of. If I had I should possibly have come to the conclusion, which is so common to the onlooker at any similar exhibition, and seems to have possessed the Judge in question, that the actual interrogater is making a terrible muddle of the questioning, but that in the hands of superior intelligence, the desired information will surely be obtainable, and so take the task into their own hands.

It was in the earlier days of my stay amongst the Eskimos. I had already been nicknamed "Kedjuckju", which I am pained to tell you signifies, as nearly as it is possible to translate a word from one language into another, "the bald-head"; and, having acquired the word for the first person singular, in my search after information wanted the equivalent of the second person in that number. "O-wung-ah", is the first person; "Ked-juck-ju", is my name which we will not again translate, and "Se-poon" is the name of my subject, that I am about to torture. Having him opposite me, I begin: "Owungah", pointing to myself, "noonockun" they, pointing to the onlookers, and with a graceful continuation of the sweeping movement with which I have included them, I allow my finger to point at or about the position that would be occupied by the second button of his waistcoat, were he wearing one. He fully recognizes that I wish his designation, so promptly answers "Sepoon". I see that I have made a failure of it so far, so try him in a different manner, pointing out that I do not speak of the onlookers individually, but collectively as "they"; nor of myself characteristically as "Kedjuckju", which we will continue

to leave untranslated, but as "I". Now, what does he call himself? He calls himself, "Owungah", "I". Then I tell him to imagine that he stands in my position as questioner, and ask him what he would call me, the second person? and he tells me that it would be, "Kedjuckju", as he has never been able to master the pronunciation of my sirname, which he now thinks I wish from him. I am fairly full of resources, but I will admit that the further I tried to go into this subject the more hopelessly did I get Mr. Sepoon mixed, so that I abandoned my search in these directions. This was a mishap that was as nothing in comparision with some of those which happened when we were laying the foundation of our knowledge of their language.

The first Eskimo that we interviewed, in answer to one of our sign enquiries, answered "Peter-ang-a-too"; it was a high sounding word, and we immediately set about discovering its particular application. As it had been used it seemed to be equivalent to our word "dead"; so we stored it away with that value attached to it. The first set speech that I delivered myself of, and I was very proud of my ability, was the following: "Ibbe micke tiddle-mun pickaninnie peterangatoo", and I supposed I had got in all the facts that were necessary to the expressing of the statement, that, "five of the puppies that belonged to the family of one of his dogs, were "dead". I was immediaty fully aware that I had not completely conveyed the information I had wished, by the look of mingled expressions that came over his face; the predominant one being astonishment, which occupied a shifting position with one that very closely resembled annoyance. I had occasion to discover later, that what I had really said was more nearly: "You are a dog, you have not got five children." "Peterangatoo" meaning, "have got none".

I have spoken of the Eskimos as having a high order of intelligence. and I would couple with it, great mechanical tastes. I think that the best illustration of the latter that I can furnish, is contained in their manufacture of the "Kyack" or boat. A vessel that is made out of the imperfect scraps of drift wood, that are thrown up on the shores on their drift through the Straits from the place of their growth in Hudson's Bay, fashioned by a knife which the

most tender heard mother of civilization would have no fear about entrusting to the care and investigation of her first born, at that age when manipulation of articles of interest is carried on with the mouth and eyes as objective points ; fashioned out of as many as two hundred, pieces of wood, I am told, the longer lengths made by the splicing of suitable shorter portions together, and the whole modelled so that it represents so perfect a model of a boat, that civilization has adopted it in all essentials, and adapted it to the racing "shell", the swiftest model of its kind. The double bladed paddle, the spears and harpoons, all are evidence of the activity of the intellect which developed the kyack. Let me try and give you an illustration of the shape of their harpoon-heads : they are fashioned out of a piece of walrus-tusk ivory, with a piece of hoop-iron inserted to form a more effective cutting edge, when they can obtain it : the head is entirely separate from the shaft or handle, to which is it attached, temporarily by means of a line of raw-hide, so that once it has been inserted into the body of their game, the withdrawal of the handle leaves it within the flesh. It is shaped, as with most nations, as an arrow-head is, but it has one very important difference, in that the shaft or shank into which the handle fits, is continued upward and outwards slightly, on one side, so that a strain coming on the line to which it is attached by a point near the middle of its length, throws it transversely across the hole by which it has entered the flesh ; and, because of the greatly increased surface that is brought to bear the strains of the struggling animal, makes its withdrawal almost a matter of impossibility.

An Eskimo's tool-box, when fully equipped, contains a series of articles that are as limited, at they seem to be ineffective for the purposes that they were originally intended. It contains, a file, a knife and a saw, and occasionally a few rusty nails. It would not be possible to do much, hurriedly, with any of these tools ; but the Eskimos have lost, or never had any expectation of these tools being more effective than they are at present ; so that they will undertake operations with these implements that would discourage any but one of their race. Fancy

drilling a hole in a piece of iron, or steel that they have taken the temper out of in the place about to be operated on, with a rusty nail! It is merely a question ot time, as it would be if the implement was not as wear resisting as the nail, but then it is discouraging, or would be to one with livelier experiences.

The houses in which they live in summer time differ but slightly from the similar structures of the indian, and indeed the word they use for the building, "Toe-pick", has so strong a resemblance to the indian word "Tepee", that one is lead to believe in a common origin for the two words. It is formed of drift-wood poles arranged with the points together at the top, and the bases distributed about a circle; the whole covered with dried seal-skins sewn together. You will understand from what has already been said of the appetite of the eskimo dog, that this dried seal-skin, is in their eyes a very toothsome article of diet. Often have I seen the friendly group, gathered within my house, dispersed as powder on the application of a match, by the arrival of one of the children who had not been completely attentive to his trust, announcing the fact that "Tiddle-me-me's" dogs or some one else's, were in the immediate act of absorbing the porch or walls or their dwelling.

Their winter dwellings, or "Igloos", are built entirely of snow, as every one knows. Snow, in a Northern climate such as this, is different in some respects from snow as we know it here. Very shortly after it falls, the extremely low temperatures it experiences, in connection with high winds, alter its consistency so that it is sufficiently hard to walk upon without the aid of snow-shoes, which are never used by the Eskimos, and so hard that the Reindeer with his relatively small feet, walks or runs upon it without fear of breaking through. This hardness continues for a great distance beneath the surface, so that in the Eskimo's housebuilding operations, he is enabled to cut out as large blocks of it as he could possibly require, and about which he proceeds in the following manner:—Having chosen a situation that is sheltered by some rocky cliff from the North and North-west winds, which are the coldest in this latitude, he marks out a circle in the snow, of about

twelve to twenty feet in diameter, in accordance with the extent of accomodation required, to represent the inner side of his house's walls : then, with his knife and saw he cuts out from within this circle, blocks of snow of about a foot in thickness by a foot high, by about two feet in length ; these he arranges about the circle he has drawn, to form part of the wall of his house, the excavating that is in this way going on leaving the solid snow for that portion of it which in beneath this surface, for a distance of about four feet to the level of the snow floor. The built-up portion of the walls commences with a very low block, and each adjoining block is of a sightly increasing height till the first circle is completed, where the last block is of its full height ; continuing the next round over these tapering ones already laid, carries the wall as a spiral of snow blocks, which, as they are all placed with their tops slightly inclined towards the centre, eventually come nearly together at the top, which is formed of a large single block which holds them as one mass. In descriptions which I have seen of this operation of house-building, mention is not made of this spiral system, it being generally stated that the blocks of snow or ice are laid in successive layers. It is not a matter of a great deal of importance which system is followed, except, in so far as it illustrates my belief that the Eskimos shew a degree of intelligence, which has permitted of their bringing each of the arts that they employ, to the very highest degree of perfection that is attainable, with the means at their disposal ; so much so that I do not think it possible that their usages could be improved. Let us see the reason for this spiral formation. Were each tier of blocks separate, there would have to be a fitting made between the first and last block of each tier, instead of each block being laid closely alongside the preceding and the whole capped by a sort of key-stone : then, every tier would be an independent structure from the one above and below, instead of being a continuation of it, as in the spiral formation.

The interior of the Igloo is divided in two, by a bank of snow opposite the entrance, which is about two and a half feet above the floor level, filling up that half, and serves as the bed place of the family. It is situated as far as possible

away from the door to avoid as much as possible of the draughts that might be expected ; and is at as high a level as possible, because heat rising, it is warmer there than lower. The temperature within the house, I found to be, when the temperature without was 4 ° below zero, 27 ° at the roof within, and 25 ° at the level of the beds. The beds themselves are formed, first by a layer of a fibrous kind of moss over the snow, then a layer of bear, or, more commonly, reindeer-skins ; then the sleeping-bags, made as a large pillow case in duplicate, the first with the fur outside, the inner with the fur next to the sleeper ; into this the seeker after sleep goes, feet foremost, having first divested himself of his clothing, which is gathered together out of the way of the omnivorus Eskimo dog. This operation of retiring is not one attended with any large degree of comfort, with the temperature as low as mentioned, but it is a necessary ordeal because it permits of the clothing, which has become damp with the vapors given out by the body during the day, becoming dry again.

On either side of the doorway, immediately on entering, are situated the fireplaces, in accordance with the practice of civilization which advises the placing of our heating apparatus as near the source of cold as convenient. In speaking of fireplaces some of you may have pictured to yourselves a goodly pile of logs giving forth a genial heat or at least glow, instead of, as the case is, a dismal apparatus burning a vile-smelling compound. The" stove" or more properly" lamp" , is composed of a shallow dish hollowed out of the stone called " soap-stone " or " steatite " , this is kept partially filled with oil in the manner we shall describe further on, and is fed to the flame through a fringe of dried moss that stretches along its front and reaches from the bottom of the dish to just above its edge, which serves to prevent the flame passing below. The oil-supply is kept up from a mass of seal fat or " blubber " which is suspended immediately behind the flame, the heat from which frees a constant supply of oil which drops into the dish beneath. This fat or blubber is not in a condition to give forth its oil until it has first undergone the process of freezing, which so solidifies the oil-sacs of which it is composed, that they are readily broken by the mass being hammered whilst in

this condition. The principal occupation of the fire appears to be the giving out of as little flame with as much smoke as possible, an endeavor that it fully succeeds in ; and then, as though in ridicule of it powers as a heat supply, a seal-skin is suspended over it to prevent the melting of the snow in the roof, a feat that it is probably able to perfrom when the temperatures that are to be expected on the approach of summer, prevail. Immediately without the door, is an anteroom, separated from the outer world by a door made out of a block of snow, or driftwood; in this ante-room, all articles that are, to the Eskimo dogs taste eatable, are placed ; beyond this room is the porch proper, without a door, into which the' said dogs come when the weather without is too severe for their powers of endurance. These doors might be likened in size to the aperture that would be considered large enough for the kennel of a good sized mastiff. They suit the purpose of the small-sized Eskimo, but they always had a hurtful effect on my sense of dignity, whenever I felt called upon to pay them a visit and had to make my approach through this doorway on my hands and knees; it was bad enough approaching to an audience in this way, but the exit used to be a moment of painful dread to me, because, amongst other things, of the step down from the level of the floor within to that of the ante-room.

I have hinted to you that the Eskimo has brought the apparatus which he has devised himself for his own purposes, to a high degree of perfection — I have also drawn your attention to the fact, that in certain of the articles he has acquired from the outer world, — the file, the saw &c., he has not been treated with that equity which is the deserving of his talents, or that which we are supposed to exercise between man and man : and I would add to the list, his gun. I do not think that I can describe the condition of the *offensive* weapon better than by the assurance that I always felt there was a good deal more danger to myself and the Eskimo, than to the game he might be intent on the slaughter of. They are not a gun that has been specially manufactured for this market ; you could not manufacture such an article ; nature and time with the gradual though thorough changes that they

bring about, have brought the implement, which had a youth some six generations ago, into the disrepute I mention.

This gun, I should say, was more effective in both its expected and unexpected directions, than the old-time bow and arrow. There are very few accidents with them, even though their bursting-charge might de expected to be so. very slight. This most satisfactory condition of the Eskimo, is entirely owing to his extreme carefulness, not of himself, but of his powder. In the first place he will not use a gun of a greater calibre than 22, more often 23. Into this he places a charge of powder, not greater than would be contained by a moderate sized thimble, then a wad of dried moss, then the ball, which he invariably recovers from the carcass of his game, if he has hit it, or from the snow, where he will search all day till he find it, if he has missed his aim. As they have generally no means of re-moulding their bullets, this repeated firing of the same ball, produce a bullet of a variety of shapes, which would be very uncertain in its results at any reasonable distance : — but then the Eskimo, on account of the smallness of the charge of powder, is obliged to approach his game within distances that would appear ridiculous to one who has not seen the operation of approach. You must not forget that the Eskimo hunts under far greater difficulties than his congener the indian. The indian has a country in which want of cover in his hunting operations, is the exception ; the Eskimo hunts where there is absolutely a want of cover : when he approaches the seal, he does so over the surface of the ice ; he is the only prominent object on that spotless surface ; when his approach is over the land, what might be inequalities in summer time, have been drifted full of snow in the winter season ; and at all times there is a complete absence of such cover as is afforded the indian by trees and shrubs. His methods of approach, are very similar to those of the indian, the principal difference being that they have to be executed with far greater care. In the case of the seal, who very rarely comes to the surface of the shore-ice, any where near the shores themselves, (because of the dangers that may be hidden behind the heaped up masses which border

it, in the shape of a waiting Eskimo,) they are therefore generally seen about a quarter of a mile off the land. The intervening space is as unobstructed as a billiard table. The seal with his tail to windwards is able thus to *watch* the direction from which "scent" will travel only short distances, whilst from the opposite direction he would receive timely notice of an Eskimo's approach by the "scent" which will be carried down by the wind. The Eskimo enters on the field of ice at a point which is intermediate between these two directions ; and laying down on the surface, propells himself towards the seal by means of vigorous kicks, when he sees that the seal is not watching, or has not at first noticed his appearance. At a very short distance, it is quite impossible to distinguish between the Eskimo and the seal, their appearance and actions are so similar, an effect that is produced in the first case by the Eskimo having habited himself with an outer coat, which has all the seal's peculiarity of marking. Up to a certain point the seal has only taken occasional notice of this object : shortly he is conscious that it has got nearer, presently this is a matter that admits of no question ; so the Eskimos occupies something like quarter of an hour, convincing the seal by a capital imitation of his every action whilst sunning himself, as he is doing at present, that he is not the enemy in disguise he really is ; having been successful in this, careful watching for the moments when the seal is not directly regarding him, permit of a further approach. The required distance is eventually overcome. The Eskimo and the seal being now not separated by more than 50 yards, the shot is fired which is capable of proving fatal at this distance. It sometimes happens, as might be expected, that the Eskimo misses his shot. One cannot help being struck with the wonderful similarity between his manner and the excuses he will give on this occasion to his friends for the failure, and the same reasons and excuses that account for the biggest fish in civilization, being lost in the landing.

In reindeer hunting, although clad in a garment that is composed of this skin, there is no hope of convincing a reindeer that this ball-like looking animal, is one of his kind : the Eskimo then proceeds to "drive" his game in this

case. One of them is hidden at the most convenient pass to the valley in which they may be feeding, whilst the others surround them at such a distance that although their presence is noted, they do not take sudden fright ; but, feeding with the conciousness that there are certain suspicious looking objects in these directions they gradually move in the direction of the ambuscade that is prepared for them.

There is a large difference between the seal's timidity when on the ice in winter time, as just explained by this hunting description, and the same animal in summer time. In the first case he is out of his element on the ice, and knows that an enemy has him there at a disadvantage ; but in summer time, in the water he has no ordinary fear, feeling that he is the equal or superior of anything afloat, besides being possessed of a more than ordinary share of curiosity. On these grounds the Eskimo can approach him in his kyack, within spearing distance, which I should say would be represented by a distance of thirty yards in the extreme. Should the seal show any anxiety about the Eskimo's approach, he is calmed by the waving of a hat or any article which may keep his curiosity awake till he is within the required distance. The spear-head once inserted into his flesh, he is "played" by the Eskimo till his struggles cease. I might remark, in passing, that the playing of a salmon from the insecurity of a kyack, would be a feat of no ordinary magnitude for a white man, and that the "playing" of a seal or walrus from the same position, is as can be imagined, one requiring the most delicate sense of balancing. It is said an Eskimo will turn over in his kyack and come up smiling on the other side, having made a complete revolution without separating from his boat. I am quite willing to admit that anyone would make the most strenuous exertions in this direction, whilst struggling head-downwards, in water which is so nearly at its freezing point, but I do not see that this would be sufficient to perform the feat.

Having told you how the Eskimo kills his game, let me now explain how he eats it, first digressing somewhat. The Eskimos are supposed to derive their name from either of two indian words "Eskimatsic" and "Askimeg"

"they who eat raw flesh". Now, I do not pretend to say that the Eskimo would deny this accusation, if it were made, but it has always been a puzzle to me, why we should have made use of a word for the name of this nation which had an origin with certain indians who inhabited the state of Main. I do not say that this is not the origin of the term, but I must admit that I should have received more satisfaction from a word, which had its origin a little nearer home. The Eskimo call themselves "Innuit", the people", a designation which perhaps covers a little more ground than they would be inclined to claim, if they knew the full facts of the case. The sailor who constantly visits there waters, sealing and whaling, calls them "Huskies", and it is not unlikely that this word may give us a clue to the derivation of Eskimo, or as the sailor would call it if he wished to frencify it, "Huskimo." There is a strong resemblance between this word "Huskie" of the sailor, and "Hus-sick-ke" the Eskimo word for a "male-Eskimo", and it does not seem unlikely to me, that we may find a derivation for the name, in this way, a good deal nearer the Eskimos' home than the state of Main.

The Eskimo generally eats raw flesh ; nature has instructed him to know that the more fat he eats, the more readily can he keep warm ; so he prefers the fat or blubber of the seal. Having a knife, he cuts a strip of the flesh and blubber off, one end of this he puts into his mouth, holding the strip distended with one hand, the other with the knife severing the mouthfuls as required, close off to his mouth, It is astonishing how fast an Eskimo will absorb a given quantity of food, which he does generally without any mastication ; and, like the indian he will eat till he cannot stand, when laying down, his wife will complete the operation, by dropping "tit bits", as he lays, into his mouth. They sometimes cook the blood, heart and other portions of the seal and reindeer over their fires or lamps : it is an operation requiring a good deal of time. They christen this concoction "Ko-fee", from a fancied resemblance in its taste and color to coffee, which they have seen and probably occasionally tasted. They did their utmost to get me to taste this compound, assuring

me it was on record that a shipwrecked mariner had wintered with them, once, and had survived this particular form of diet, which he had seemed to prefer to the raw one. Whilst perfectly willing to believe all they had to say on this subject, I positively refused to try it, pleading having but recently breakfasted. After this I always made my visits to this Igloo, immediately after meal time. The Eskimos tell one that they never quarrel amongst themselves. I have never seen an approach to a quarrel, which I largely attribute to want of opportunity. Their traditions speak of their encounters with the indians, in that struggle, or series of struggles which has resulted in their occupying their present isolated position ; this may have been merely a struggle for existence, without passion. On the other hand, I have seen a mother lose her temper with her offspring, and thump it,—yes thump it—in just such a civilized and hearty way, as is a familiar sight where passions are an admitted, though perhaps unnecessary part of the disposition. Of baby-hood, I saw a great deal ; mothers, in that rush which I have spoken of, to save their very house from the dogs, would thrust their babies into my hands, gather up their shirts, so to speak, and leave me the sole charge of their treasures. In these intervals, with man's awful dread of a crying anything, worst of all a baby, opportunity was afforded for mutual investigation, and huge concessions on my part. It often had my watch, which never satisfied it till it had it open and had made several attempts at rearranging the works with a greasy finger. It should have had the lamp, if it had shown any attempt at crying for it, rather than that the mother should return, and find it in tears, apparently the effect of my having pinched it. As elsewhere, nothing seemed too large for them to attempt to get into their mouths, nothing that they got in that they did not swallow, if not prevented, Girlhood, in which they aped being grown up, and kept house for an imaginary household. Boyhood, that performed the most extaordinary feats of stalking imaginary game ; or that went on long voyages in an imaginary kyack, and performed unheard of feats on unheard of animals. Manhood with the realities of life and the struggle for existence. Womanhood, with its

household duties, and the part of a beasts of burden as with other uncivilized nations ; yes, and the moments of entire enjoyment, when, like the rest of her sex elsewhere, she took such an interest in the discussion of matters that would be classed as "gossippy".

The youth of civilization, when seeking a partner for life, sets up an ideal character in his mind, with certain characteristics which are essential; and then quite often marries some-one without any of them. The Eskimo, although not perhaps such an idealogue, insists upon his materialized ideal possessing certain traits. She should be fat, for choice ; she is certain to be hard-working ; she *must* have good teeth. Teeth, anywhere, are a convenience; amongst Eskimo women they are an essential. It would be like depriving the seamstress of her work-box, for an Eskimo woman to have the toothache. She would be as a drug upon the matrimonial market, did she shew any incipient signs of weakness in this department : for, every article of wearing apparel which is made out of the seal or walrus-hide, has to be patiently chewed in the mouth, to bring it to the condition required to receive the stitches ; as a piece of such a hide, is about as unmanageable, before undergoing this process, as a piece of sheetiron would be, —not if either were to be operated upon by a cold-chisel, but as far as the effects on it of a needle are concerned. And I assure my audience that they can have but a faint idea of the amount of chewing which is required to keep even the smallest Eskimo family in boots, to say nothing of the remaining articles of attire. Even when the boot is made, it gets hardened with use, so that in wearing they are constantly subjected to this re-juvenating process. If you are paying them a visit, and they wish to shew you the highest form of civility, the father will say, "Ung-ar-low", (one of the children) remove this gentleman's boots, and give them to your mother to chew", and there, whilst you are about your business, will this patient being sit, taking a disjointed part in your conversation, at such moments as her occupation will permit.

I have described their kyacks or water vehicles ; let me describe their "kom-mit-ticks" or winter sleighs. They are made with "runners", of about 10 to 12 feet long, secured by

cross-pieces securely lashed to them, made out of drift-wood, or the wreck of some unfortunate vessel ; they are shod with bone, just in the same way that our sleighs are with iron : this bone shoeing, when they are travelling, is covered with a film of ice, by squirting water over it, and smoothing the surface rapidly with the hands, whilst in the act of freezing, so as to ensure an even surface. You would be astonished at the length of time that this ice-covering will last : once in a days march being generally sufficient to renew it, which they do from water that they carry with them in a bag made of seal-skin, which has been wrapped away amongst a heap of furs to heep it from freezing. Into this sleigh are harnessed from ten to possibly fourteen dogs, each attached to a separate line of white-porpoise hide ; the leader on the longest line, and the rest in pairs, one on either side of the leaders line, and the pairs one behind the other on lines of the necessary length. This is the theoretical arrangement, and to some extent the arrangement on starting ; once started, the dogs arrange themselves in a fan-shaped way, and cross from one side to the other either to change the direction of the hauling strain, or out of sheer perversity. The whole is controlled by the Eskimo's voice, and, a perhaps more effective whip, which has a handle of eighteen inches in length, and a lash of eighteen or twenty feet. An Eskimo wields this weapon with unerring precision and effect ; a white-man with even greater effect but with much less precision, because his endeavor seems to be put forth in directions which are as unexpected to his audience as they certainly are to himself ; and like the lightening rarely, if ever, strike twice in the same place. As the dogs proceed on the way, every thing they pass which might have the appearance of being eatable, is investigated by a rush of inspection from one of them, who swings out from the pack on his line, reaches it if it is within the limits of its length, investigates, and returns if it should prove a disappointment, without having stopped the march.

If it should prove something eatable, the rest of the pack are upon him in an instant, and a struggle ensues, which — yes, beggars description. You can imagine the

effect of some twelve dogs propably fighting for the only morsel they are likely to have eaten for the past two or three days; then add to this the several twelve strings, the howling Eskimo and the twenty foot whip, and I believe you will have a very fair idea of the picture I would present.

When the dogs are following along a path which they have already been over, no guide is necessary: but when the road is an unknown one, each of the party including the women take turns in running ahead of the dogs to show the way. The dogs follow the easiest way for themselves after the human leader, whilst one of the Eskimos who remains on the front of the kommittick, guides it, by thrusting the kommittick to one side with his foot so as to avoid any lump of ice, or protruding rock, that would destroy the ice-film of the runners. You will understand, from the way that the dogs are attached to the kommittick, that on going down hill, the realization of the hope you have, that you will get safely to the bottom, will depend on several conditions which are not all in your, or the Eskimo's control. First, the dogs must be able to reach the bottom before the kommittick does; should it overtake them, they will be scattered in every direction, than dragged by their lines in every conceivable position, till the sleigh is either overturned or brought to rest, generally the former. Then, it is a much more difficult thing to steer a twelve foot sleigh such as this, than it would be to guide the movements of one of less length, particularly when rushing at the speeds that they attain; it therefore quite often happens, that the dogs rush down the hill in the required direction, whilst the kommittick rushes in a slightly different one, so making their attempts to escape only temporarily successful, for shortly the divergence is so great, that, first a strain is put upon their lines by the increasing distance between them, then the kommittick passes them, turning them so that they face up the hill for an instant; then they are upset and dragged; then the kommittick is upset, and its contents, human and otherwise find a resting place some little distance further on than the bottom of the hill. The Eskimos do not seem to mind these experiences, principally

because of the safety afforded them by their innumerable articles of fur-clothing. I used to pretend not to mind it, principally because the Eskimo, having a high sense of humor, I was afraid of increasing their desire to witness the operation of my flight, in more than the unavoidable occasions.

The Eskimo uses his gun as little as possible, because of the extravagant cost of its charge. Wherever possible he use his spear. In winter-time, when the deeper bays are frozen over, he has an opportunity of doing so: for then the seal feeding within its waters, has to keep certain holes open in the surface of the ice, to serve the purpose of breathing; and alongside these, the patient Eskimo will watch all day, without a move, awaiting the seal's necessity and his own opportunity. If the seals have not made holes for this purpose the Eskimo will make them for him, and trust to their being convenient to the seals purpose and his own. He generally finds that the seals have one or two in use in each of these large bays spoken of; but it shortly happens that the seals, missing their companions through this means of exit from the watery world, become too timid to use so apparent a trap, and seek either the outside waters, or some other bay. The Eskimo then goes in search of a position where the seals are likely to have to pass quite frequently, and where, being passengers, the abstraction of one of their number will not raise alarm amongst the others, who will be coming later. He therefore chooses some strait between an island and the main-land, of considerable length so that the passing seals will find the hole he has cut in the surface of the ice, sufficient of a convenice, to permit of his running the risk in any attempt at appearing out of his element. This hole is cut by the Eskimo, by means of a spike which he has on the end of his spear. Having made it, he throws a slight covering of snow over the surface of the water within, to prevent the seal catching a glimpse of him before he has come within spearing-distance. Then crouching about armslength away from the hole, he waits, without a move (which may be made at the very instant when a seal is approaching and so give a warning which would lose him his game,) till he hears the scratching of the seals flippers as he works his way up

through the ice to breathe or sun himself; then the swiftly descending and unerring blow. I have never seen this blow actually given: I have kept company with him in his watching till intense excitement gave place to freezing indifference, and I had to leave; I have watched him from the shore, where this indifferencc was counteracted by accasional excursions for warmth, but have always returned to find apparently the same undiminished patient expectancy.

The seal, in winter-time, lives in the snows on the shores just above high-water mark; into this house, a hollowed out cavity, he comes at or about the time of high-water, the tide having by its increase, raised the ice so that the seal's passage beneath is possible; he can therefore enter or go out during the few hours that cover the period of high-water; between these conditions of the water, he must either stay within or without. An Eskimo, with a dog suitably trained, will follow along the shores, at suitable times, till he comes to the locality of one of these houses, the position of which is indicated by the dog's instinct; then the Eskimo spears, knowing that the seal cannot escape, till he has been successful in his aim.

I have shewn how economical the Eskimo is in the use of his powder and ball: so is he with his gun-caps. It is true that a gun-cap can be used but once as a whole — but then the Eskimo uses it in part several times, by dividing the fulminating powder within it into three or four pieces: one of which, at a time, he uses by placing it within the head of an already used cap. So with his matches, he divides most of them in two lengthwise, by very carefully cutting through the composition at the end, with his knife, an operation that would puzzle the ordinary individual.

Of their ceremonies and religious beliefs, they are very reticent about speaking to any one, having probably in recollection the want of sympathy shewn by the rough sailor for the subject; and, not caring to risk a repetition, we could get very little information out of them. They believe in a future existence, with plenty as the reward, and bury with the deceased his knife, and, once upon

a time, his gun. Today, they no longer supply him with his gun, as the experience has been, that it is not reserved for his future use, as the modern skeptic amongst the Eskimos, probably reasoning that if game is as plentiful as represented, there would be no use for the article, takes it to himself. They bury nothing with their womenkind, arguing that some happy hunter will look after their welfare in the happy hunting ground. They have the very highest respect for the white-man's medecines, but depend entirely on incantations for their own treatment in emergencies. When one of my party was laid up with scurvy, being anxious to see their treatment, we called in one of the leaders in the art; who, after assuring us that the subject was under the influence of the wicked spells of an opposition doctor, said that, with proper precautions he would be brought around; this was very interesting information to me, as I was the patient. I will not give you a further description of the *modus operandi*, of this enchantress, (the learned professions, or profession, being filled by those of the less stern sex), than by saying that they consisted of a series of grotesque movements and incantations, in which a somewhat numerous chorus took part to the solo of the doctress. At different stages in the proceedings, one was asked if we felt better? In answer to which, the only assurance that could with truth be given, was; that we felt no worse. Then the suggestion was made that we should double the chorus and the doctors, a proceeding that we did not agree to, as, having seen all of the operations which were necessary for our information, we did not see the object of it. The enmity of this opposition doctress was earned in the most simple way: her name had been, Ick-tu-ad-de-lo, "The prophetess", and we thought we were shewing our appreciation of the changes to which the language might be put, by altering it to, Ictu-we-awee-ah, "The wooden-man"; an attempt at a pun, which seemed to be fully appreciated by her fellows, and lost on herself. They protect themselves from infectious disease, and other ills, by sewing one or more strips of sealskin about their outer garment, somewhat in the form of a maze; so that the spirit of the ill, approaching by way of this outer garment, and

following along these strips, may get lost before he can enter the body. Then they eat certain portions of the body of the seal, walrus and reindeer, as cures for certain lesser ills, and bind the body into all sorts of positions, with thongs of raw-hide, for pains and aches.

The Eskimo have a large amount of admiration to bestow on the white-man and his ways: they are the most satisfactory audience I ever had to exhibit conjuring tricks before, showing the moust hearty appreciation for ones feeblest endeavors. But of all things which pleased them, were writing and telegraphy. Write a message to one of your men, at a distance from your house, give it to an Eskimo explaining to him what the import of the message is, and that it will be understood from those few insignificant looking lines, and he is lost in astonishment and admiration for the art. Tell him that you will by a series of rappings, in accordance with the system of telegraphy, give any message he may dictate to you, to your man, at the other end of the room, which he feels is being delivered in his own tongue as he has giving it, and you have him in a condition capable of believing the impossible. I do not think that there was any thing which gave them more constant pleasure than the flying of a kite, which I made for them. Had I so wished it, I might have considered the privilege of being allowed to fly this kite, sufficient reward for any service, and met with no complaint from them. They never seemed to tire of watching its graceful movement; and when, sometimes, we used to put it a little out of adjustment, so that in its flight it would occasionally perform those sudden darts and swoops, which are so familiar to us all, there seemed no end to their appreciation. Then, their admiration of the feat of sending up a "messenger" of paper along the string, was very full; but nothing equalled the satisfaction they received from being allowed to fly it themselves.

Of the toys which we made for the children, including most of the wooden articles which are to be seen in the shop windows at this season, nothing seemed to give so much pleasure as a "swing". Mothers, Fathers, sons, daughters and infants, kept the thing incessantly in motion, during the hours that we were obliged to

set apart for the purpose, as it was suspended from the beams of our kitchen ceiling, and there were times when its use would have been inconvenient. All were pleased with it, and mothers made use of it to quiet their infants, when other efforts seemed unavailing to reduce them to that condition which they are pleased to believe, and invariably describe to their intimates, as their normal one — Who ever knew an infant which was not to a mother, "just the best natured baby in the world!"

Then we left them, glad at the opportunity of returning to our friends and more familiar occupations, but with a mutual regret at the severing of an association, which had made an otherwise dreary residence, one of some interest; leaving behind us, let me hope, a no less pleasant memory than we brought away.