Dear Colleagues

**The origins of rifle shooting in genetics and epigenetics**

**Problem:**it has been speculated for centuries that a family is able to impart to the next generation, the characteristics of a sport champion, an academic, scientist, medical practitioner, lawyer, military strategist, artist or teacher. However, no gene has been identified in a genome, which specifically enables a person to shoot a rifle, confirm a natural law through scientific experiment or undertake brain surgery. Despite this demonstrated fact, the offspring of medical and other families, often appear to inherit characteristics which result in their successful study and entry to such professions.

**Discussion:**there is however an epigenetic ability which can enable a person to learn, master and carry out intricate techniques in many fields of activity. Such ability arises through exposure to anenvironmental factor, whichactivates genesspecific to the necessary cells and tissues, enabling them to perform key tasks. Such inherited ability involves the timely activation of genes. That is, epigenetic processes only involve heritable functions.

A critical moment in our lives illustrates the importance of epigenetics. This illustration concerns the final development of the lungs upon exposure to air at the moment of birth. After months of being bathed in fluid within the mother’s internal environment, lung tissues are suddenly exposed to air and at this moment, a bisecting wall of tissue forms across the centre of the heart. The latter causes blood to circulate through arteries to the lungs and around the body, returning to the heart through veins. This new flow-path, through a heart-valve pumping mechanism, prevents blood from flowing in one side and out the other side of the heart as occurred within the mother. As a result of these and many other timely changes throughout the life-cycle of the individual,epigenetics is considered to be at the epicentre of medicine.

Perhaps just as remarkable is the value of epigenetics in learning. Through this, every person needs to be educated with emphasis upon the teaching of detailed techniques and experiences in performing them. Teaching and performance constitutes the environmental factor which activates the particular genes. In this way, concepts and practices are memorised and assimilated through practice, becoming routine brain functions. As a result, teachers need to ensure that learning happens in this way in the education of every young person.

Sadly, the children in schools of most countries, are taught by teachers who follow an earlier idea, thatyoung people already possess inherited ability to learn. It is assumed that we are born with our complement of brain cells which cannot be replaced. Just as serious is the idea that nothing can be done which may enhance the functions of brain cells. As a result, teachers without an understanding of the epigenetic processes of learning, advise perhaps 90 percent of young people, that they do not have the necessary ability to learn mathematics, the sciences or to undertake university studies. Instead, they proudly declare that their schools enable young persons to achieve to the limit of their learning potential. There appears to be little or no understanding among teachers and many parents, that education should extend a student’s ability to a higher level, through further development of brain cells and their functions. This has now been demonstrated in a phenomenon known asbrain plasticity.

The existence of highly-skilled or super teachers, who have the ability to teach students with greater success than most other teachers, still remains a mystery to the teaching profession. These teachers have the ability to engage each student through the logical sequence of initiating a desire where their inner drive leads them to understand and perform successfully. That is, they subject young people to suitable environmental exposures, which activate the necessary genes and make learning possible at a far higher level for nearly all young people, who would otherwise be told they have no ability to study for a professional career or that theydo not have a mathematical brain.

New shooters who choose to learn about and participate in this sport, are often expected by fellow shooters to have some inherent ability acquired from a parent or other relative. Most are unaware of this and so are thought to have an unknown inherited ability. As a result, many new shooters are subjected to being thrown in the deep end, to see whether they will sink or swim as shooters. From this, many less-skilled shooters proudly declare that all their knowledge of shooting has come from personal experiment, tested through trial and error to see which techniques work.

Rifle shooting is like any other field of learning, requiring assistance to learn about particular techniques and to practice them. It is like all sport activities, simply a field of learning and practice, which requires the help of skilled teachers of shooting.

**Practice:**a highly-successful learning technique involves examining the groups of all shooters of a club after each day at the rifle range. An appropriately skilled shooter is able within 10 seconds, to look at a group and decide whether a shooter experienced a technique difficulty. He is then able to prescribe a well-known cure. In particular, the coach is able to observe, diagnose and prescribe for:

* a loose sling, indicated by shots above and below a central group (cure: use the standard test, then tighten sling 1 notch; TR)
* change of the natural point of aim, indicated by 2 or 3 sub-groups across the target (cure: identify the muscles that moved during a shoot, then control this; F Class and TR)
* trigger release affected by a tremor, indicated by shots in a group around the 6-ring or the perimeter of the bullseye (cure: release shots with the required degree of care or follow-through to prevent a tremor occurring; F Class and TR)
* the thumb of the trigger-hand absorbing recoil, indicated by shots at 7 o’clock for a RH shooter (cure: position thumb to not absorb recoil; F Class and TR)
* absorption of recoil at the sling swivel, indicated by shots at high-left and low-right for a RH shooter (cure: position hand so as to not absorb recoil at the sling swivel; TR)
* a group wider than 0.5 MOA due to trigger-release, indicated by absence of follow-through even though pulling slowly, but without mental monitoring of how far the trigger has been slowly pulled, F Class and TR)
* shots resulting from arm muscle tension, indicated by shots above and below the V-bull or X-ring; F Class and TR).

Weekly practice enables each shooter to not just perform these techniques properly, but extends his/her range of learned skills, i.e. enlarging the inherited ability of cells of the brain, i.e. brain plasticity.

**Conclusions:**there is no gene responsible for a field of skill such as rifle shooting. However, the plasticity of the brain allows it to be extended to deal with more and more techniques within such a sport activity or any other field of learning. This is an aspect of the normal processes of learning. Shooters are today being assisted by coaches to increase their brain plasticity to master further techniques and as a result, become leading shooters.

Best regards

Geoff