

"3. On the spinal cord it has the effect of lessening the conducting power of the sensory columns of the cord. This was proved by Bennet, who found that while irritation of the posterior roots of the cord caused violent struggles and loud cries before the injection of caffeine into the circulation, similar irritation after injection caused only a slight quiver, and this effect was not due to motor paralysis, as shown by the fact that irritation of the anterior columns caused violent muscular contractions after the injection as well as before it.

"I have given this demonstration in full, as I notice in the article on 'Caffeine,' in Foster's 'Encyclopædic Medical Dictionary,' it is stated that caffeine heightens the reflex activity of the spinal cord.

"4. On the brain: It is probable that tea and coffee cause local dilatation of the arteries supplying the brain, and possibly caffeine may increase the mental powers by a direct action on the brain tissue itself.

"5. On the accelerating centre the stimulating effect of caffeine is evidenced by the injection of the drug after previous section of the vagi, rendering the pulse still more rapid than before.

"6. On the vasomotor centre stimulation is evidenced by a rise of blood-pressure, which disappears on section of the spinal cord below the medulla, and does not occur if the cord has been divided before injecting the drug.

"7. On the cardiac muscle caffeine acts as a stimulant, as is shown by increased energy of contraction, the rate of pulsation remaining the same or becoming slower.

"8. As a diuretic caffeine acts on the secreting nerves or secreting cells of the kidney itself, causing an increase of water excreted.

"9. Its action on the respiratory centre is to increase the respiration.

"10. The salivary secretion appears sometimes to be increased.

"11. On the peristaltic action of

the intestine it has little action, but it causes the intestinal veins to become much dilated and appears to cause hemorrhoids.

"12. The temperature is not altered by small doses of caffeine, but is increased by large doses.

"As regards heat production and tissue metamorphosis, the investigations of Dr. Edward T. Reichert on the action of caffeine on tissue metamorphosis and heat phenomena are of great interest. His conclusions are that caffeine increases heat production, and as a corollary increases destructive tissue metamorphosis, and therefore concludes that the virtues of coffee in the wear and tear of active life are entirely subjective and depend upon a general excitation of the higher tissues, and chiefly upon its powerful exhilarant action upon the mental processes. He also says that the assumed ability of coffee to replace food or to increase the power for work without corresponding tissue destruction is consequently entirely deceptive, and the conditions produced by it are comparable to those observed at times in the insane, in hysteria, or in fright, when the individual may be capable of performing prodigious feats of strength and endurance but nevertheless at the direct expense of his tissues.

The toxic action of coffee and caffeine on persons easily susceptible to their influence, or in toxic amounts, is confined exclusively, so far as we know, to overstimulation or functional depression of the various nerve-centres and some local irritation of the stomach and bowels.

Caffeine, according to Dr. Brunton, causes at first stimulation and subsequently paralysis of nerve-centres in cerebrum, cord and medulla.

"As to its action on the muscles, voluntary and involuntary, caffeine in small doses has a restorative action, while in large doses it is a powerful poison.

"From its stimulant action on the brain, caffeine, in doses of two to