spread throughout the brainstem, the cerebral cortex, and the spinal cord. (McManamy)

These pathways function in, most importantly, mood, anxiety, and emotional control, the regulation of sleep, cravings, hormonal activity, as well as, pain perception, body temperature, and blood pressure. Low levels of serotonin can be apparent through such behaviors as unstable moods, insomnia and overeating. Aside from an overall decrease in serotonin found in depressed patients (including those with bipolar disorder), studies have found a decrease in the density of serotonin 1A receptors in several areas of the brain of bipolar patients. Interestingly, several other studies have also shown an increase in the density of serotonin 2 receptors in the platelets and brains of depressed patients, which could be explained as an “adaptive up-regulation in response to decreased synaptic serotonin”. (Lundbeck Institute; brain.nature.org)

Norepinephrine courses in the locus coeruleus, raphe, and the reticular formation and projects to the cortex, hippocampus, thalamus and the midbrain. It is a form of stress that increases excitatory activity in the brain, and coordinates the sympathetic “fight or flight” response. Aside from attention and arousal, it also functions in the regulation of mood and anxiety. Difficulty concentrating, fatigue, apathy, and depression are some symptoms that may occur due to an imbalance of norepinephrine. (McManamy) Studies have found increased concentrations of norepinephrine and the norepinephrine metabolite, 3-methoxy-4-hydroxyphenyglycol (MHPG), in the urinary and cerebrospinal fluid of patients with mania, suggesting that norepinephrine and MHPG output “is