Melanocortin-3 receptor (MC3R) is a regulator in energy homeostasis, and interaction of MC3R and melanocortin receptor accessory protein 2 (MRAP2) plays a critical role in MC3R signaling of vertebrates. However, the physiological roles of MC3R in teleosts are not well understood. Herein, we cloned topmouth culter mc3r with a 984 bp open reading frame encoding a protein of 327 amino acids. qRT-PCR indicated that mc3r had higher expression in the central nervous system. In the periphery, mc3r was expressed in liver, testis, and head kidney in the male, whereas it was mainly present in skin and ovary in the female. Culter MC3R expressed in HEK293T cells could bind to five peptide agonists with a higher Bmax than human MC3R (hMC3R). In addition, caMC3R had higher affinity to ACTH and lower affinity to D-Trpγ-MSH compared to hMC3R. All agonists could stimulate caMC3R and increase dose dependently intracellular cAMP accumulation. Culter MC3R showed a higher constitutive activity in cAMP signaling, higher efficacies and Rmax to γ-MSH, des-γ-MSH, ACTH and D-Trpγ-MSH. Culter MRAP2A remarkably decreased cell surface expression but had no significant effect on total expression of caMC3R, whereas caMRAP2B had no effect on both cell surface and total expression of caMC3R. CaMRAP2A and caMRAP2B both remarkably decreased basal cAMP production. Furthermore, caMRAP2A significantly decreased Bmax and Rmax while caMRAP2B did not affect ligand binding and agonist-stimulated cAMP. These results will promote further research on the physiological roles of MC3R in topmouth culter.