JWST-MIRI deciphers the distribution of dust-obscured star formation in galaxies since z~2.5

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We study the stellar (i.e., rest-optical) and dust-obscured star-forming (i.e., rest-mid-infrared) morphologies (i.e., sizes and Sersic indices) of star-forming galaxies (SFGs) at 0.1<z<2.5. We combine Hubble Space Telescope (HST) images from the Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey (CANDELS) with JWST images from the Cosmic Evolution Early Release Science (CEERS) survey to measure the stellar mass and dust-obscured star formation distributions of 95 SFGs galaxies. Rest-mid-infrared (rest-MIR) morphologies are estimated using the sharpest Mid-InfraRed Instrument (MIRI) images (i.e., shortest wavelength) dominated by dust emission (S_dust/S_total >75%), as inferred for each galaxy from our optical-to-far-infrared spectral energy distribution fits with CIGALE. Our MIRI-selected sample corresponds to a mass-complete sample of SFGs down to 10^10 Msun at z~2. The rest-MIR Sersic index of bright galaxies (S/N>75) has a median value of 0.7, i.e., disk-like morphology, in good agreement with their median rest-optical Sersic indices. Galaxies above the main sequence (MS) of star-formation (i.e., starbursts) have rest-MIR sizes that are on average a factor ~2 smaller than their rest-optical sizes. The median rest-optical to rest-MIR size ratio of MS galaxies increases with their stellar mass, from 1.1 at 10^9.8 Msun to 1.6 at 10^11 Msun. This mass-dependent trend resembles the one found in the literature between the rest-optical and rest-near-infrared sizes of SFGs, suggesting that it is primarily due to dust attenuation affecting our rest-optical sizes and that the sizes of the stellar and star-forming components of SFGs are, on average, consistent at all masses. There is, however, a small population of SFGs (~16%) with a compact star-forming component embedded in a larger stellar structure, i.e., Re_Opt > 1.8xRe_MIR. This population could be the missing link between galaxies with an extended stellar component and those with a compact stellar component; the so-called blue nuggets.